1. Chemical Calculation

1. A mole of a substance contains ………………
   (a) 1 molecule  (b) 6.023 x 10^{-23} molecules  (c) 1 atom  (d) 6.023 x 10^{23} molecule

2. Molar mass of carbon is exactly equal to …………….
   (a) 1 g mol^{-1}  (b) 12 g mol^{-1}  (c) 6 g mol^{-1}  (d) 32 g mol^{-1}

3. According to electronic concept, oxidation reaction is the one in which ……………
   (a) loss of electron take place  (b) gain of electron take place
   (c) addition of hydrogen take place  (d) addition of electropositive element take place

4. The reaction in which gain of electrons take place is known as ……………
   (a) oxidation  (b) reduction  (c) hydrolysis  (d) addition reaction

5. The oxidation number of an element in the free state is always ……………
   (a) positive  (b) negative  (c) zero  (d) whole number

6. The oxidation number of phosphorus in PO_4^{3-} is equal to ……………
   (a) +3  (b) -3  (c) +5  (d) -5

7. The molecular mass of volatile compound is determined by …………… method.
   (a) hydrogen displacement  (b) Victor Meyer
   (c) oxide  (d) Chloride

2. General Introduction to Metallurgy

1. Which one of the following metal occur in native form?
   (a) Tin  (b) Zinc  (c) Platinum  (d) Calcium

2. The mixture of ore with earthy impurities is known as ……………
   (a) flux  (b) slag  (c) gangue  (d) mineral

3. Which one of the following metal can occur in free state as well as in combined state?
   (a) Tin  (b) Zinc  (c) Gold  (d) Silver

4. Identify the ore of the metal aluminium ……………
   (a) Bauxite  (b) Clay  (c) Aluminate  (d) Al_2(SO_4)_3

5. Which one of the following is the formula of clay?
   (a) Al_2O_3 \cdot 2H_2O  (b) Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O  (c) Al_2(SO_4)_3  (d) Al_2SO_4 \cdot K_2SO_4 \cdot 24H_2O

6. Which one of the following is the ore of mercury?
   (a) Galena  (b) Pitch blende  (c) P7yrolusite  (d) Cinnabar

7. Galena is an ore of which metal?
   (a) Lead  (b) Meucury  (c) Silver  (d) Tin

8. Which one of the following is the formula of Rock salt?
   (a) NaHCO_3  (b) Na_2CO_3  (c) NaCl  (d) Na_2SiO_3

9. Which process is applied to concentrate oxide ore?
   (a) Hand picking  (b) Hydraulic washing  (c) Chemical method  (d) Froth floatation process

10. Which one of the following ore is concentrated by Froth floatation process?
    (a) Sulphate ore  (b) Phosphate ore  (c) Oxide ore  (d) Sulphide ore

11. Which one of the following is used as foaming agent?
     (a) Water  (b) Air  (c) Pine oil  (d) Kerosene

12. Identify the method to concentrate Tinstone ……………
     (a) Chemical method  (b) Hand picking process  (c) Froth floatation process  (d) Electromagnetic separation process
13. Chemical method is applied to concentrate ………………… ore.
(a) Zinc blende (b) Bauxite (c) Tinstone (d) Phosphorite
14. The reducting agent used in reduction roasting is …………………
(a) water (b) active hydrogen (c) carbon (d) Either (b) or (c)
15. Heating the ore in the absence of air is called …………………
(a) roasting (b) smelting (c) calcinations (d) reduction
16. What is the function of limestone in smelting process?
(a) Catalyst (b) Oxidising agent (c) Reduction agent (d) Flux
17. The lining in basic Bessemer process is …………………
(a) silica (b) lime (c) SiO₂ (d) Both (a) or (b)
18. Which one of the following is used as an electrolyte in electrolytic refining of silver from argentiferous lead?
(a) Silver sulphate (b) Silver chloride (c) H₂SiF₆ + PbSiF₆ (d) SiF₄ + H₂SiO₄
19. Which one of the following is the purification of process of lead?
(a) Mond’s process (b) Bett’s process (c) Bessemer process (d) Cyanide process
20. Which one of the following is called Felspar?
(a) Na₃AlF₆ (b) Na₂SiO₃ (c) K₂OAl₂O₃ 6SiO₂ (d) NaF

3. Atomic Structure I

1. The introduction of atomic theory was given by …………………
(a) Neil’s Bohr (b) Rutherford (c) John Dalton (d) Thomson
2. The total number of nucleons is termed as …………………
(a) Atomic number (b) Mass number (c) Nuclear charge (d) Quantum number
3. The two dimensional circular path taken by electrons is known as …………………
(a) orbit (b) orbital (c) sub shell (d) nucleus
4. An orbital is a three dimensional boundary of space where there is maximum probability of finding …………………
(a) protons (b) electrons (c) nucleons (d) neutrons
5. The number of protons is known as …………………
(a) Mass number (b) Atomic mass (c) Atomic number (d) Nuclear number
6. When the principal quantum number n value is 3 means, the electron present in which energy level?
(a) K (b) L (c) M (d) N
7. The splitting of spectral lines by magnetic field into multiple lines is known as …………………
(a) Photo electric effect (b) Stark effect (c) Zeeman effect (d) Spectro effect
8. It is impossible to determine simultaneously with the certainty the position and momentum of a particle. This is known as …………………
(a) Pauli exclusion principle (b) Hund’s rule (c) Aufbau principle (d) Heisenberg’s uncertainty principle
9. What is the principal quantum number value if the electron is present in N energy level?
(a) 3 (b) 4 (c) 2 (d) 1
10. Which quantum number indicates the shape of the orbital?
(a) Principle quantum number (b) Spin quantum number
1. The energy level in which the electrons are located is given by which quantum number?
(a) Magnetic quantum number  (b) Principal quantum number  
(c) Subsidiary quantum number  (d) Azimuthal quantum number

12. Which quantum number determines the orientation of the orbital in space?
(a) Magnetic quantum number  (b) Principal quantum number  
(c) Azimuthal quantum number  (d) Spin quantum number

13. How many sub levels are possible for the principal quantum number 4?
(a) 1  (b) 2  (c) 3  (d) 4

14. How many sub levels can be present in main level 2?
(a) 2  (b) 3  (c) 1  (d) 4

15. The maximum number of electrons that can be accommodated in the energy level is given by the formula …………………
(a) n + 1  (b) 2n + 2  (c) 2n²  (d) 2(n+2)²

16. The number of electrons that can be accommodated in the sub level is deduced by the formula ………………….
(a) 2n²  (b) 2(2l + 1)  (c) (l + 1)  (d) 2n + 1

17. What is the total number of orbitals associated with the principal quantum number n = 3 ?
(a) 3  (b) 6  (c) 4  (d) 9

18. Which orbital has spherical node?
(a) s  (b) p  (c) d  (d) f

4. Periodic Classification - I

1. The law of triads was given by …………………
(a) Newland  (b) Dobereiner  (c) Mendeleev  (d) Lother Meyer

2. Which one of the following does not obey the law of triads?
(a) Li, Na, K  (b) O, H, N  (c) Ca, Sr, Ba  (d) Cl, Br, I

3. Mendeleev’s periodic classification was based on the ………………… of elements.
(a) atomic number  (b) mass number  (c) number of neutrons  (d) number of electrons

4. Modern periodic law states the properties of the elements are periodic function of their …………….. 
(a) atomic mass  (b) mass number  (c) atomic number  (d) number of nucleons

5. The element with atomic number 110 has the symbol according to IUPAC nomenclature is …………….
(a) Uun  (b) Une  (c) Unh  (d) Unq

6. The IUPAC name formula U₈₂ indicates that element has atomic number as …………….
(a) 106  (b) 101  (c) 107  (d) 117

7. Group numbers 13 to 18 are named as …………………
(a) d-block elements  (b) transition elements  (c) p-block elements  (d) inner transition elements

8. Alkali metals belong to …………………
(a) group 3  (b) group 2  (c) group 18  (d) group 1

9. The elements with electronic configuration ns² np⁶ are named as …………………
(a) representative elements  (b) noble gases  (c) alkali metals  (d) alkaline earth metals

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10. The group 17 elements are belongs to …………
(a) noble gas family  (b) alkaline earth metals  (c) halogen family (d) radioactive elements
11. The amount of energy required to remove an electron from a neutral gaseous atom is known as ……………
(a) Electron affinity  (b) Electron gain enthalpy  (c) Ionisation potential  (d) Electronegativity
12. The unit of electron affinity is ……………
(a) kJ mol⁻¹  (b) cals  (c) kg m⁻³  (d) joule
13. Which one of the following does not affect Ionisation energy?
(a) Atomic size  (b) Nuclear charge  (c) Screening effect  (d) Photoelectric effect
14. Which one of the following is not a periodic property?
(a) Atomic radii  (b) Electronegativity  (c) Ionisation potential  (d) Electron affinity
15. Electron affinity of noble gases are ……………
(a) zero  (b) maximum  (c) minimum  (d) positive
16. As we move down the group, electronegativity value …………..
(a) increases  (b) decreases  (c) remains constant  (d) irregularly varies
17. Coloured ions and complex salts are readily formed by …………..
(a) 2-block elements  (b) p-block elements  (c) d-block elements  (d) f-block elements
18. The newly discovered element with atomic number 109 is ……………
(a) Rutherfordium  (b) Meiterium  (c) Bohrium  (d) Dubnium
19. Which one of the following requires highest energy?
(a) M(g) → M⁺(g) + e⁻  (b) M(g) → M²⁺(g) + 2e⁻  (c) M(g) → M³⁺(g) + 3e⁻  (d) M(g) → M⁴⁺(g) + 4e⁻

5. Group 1s-Block Elements
1. Identify the element which does not have neutron?
(a) Hydrogen  (b) Heavy hydrogen  (c) Tritium  (d) Lithium
2. The number of neutrons present in the nucleus of deuterium is …………..
(a) 3  (b) 2  (c) 1  (d) 0
3. The percentage abundance of protium in native is …………..
(a) 0.016  (b) 99.984  (c) 10⁻¹⁵  (d) 1
4. The number of neutrons and protons present in Tritium are …………..
(a) 2, 1  (b) 1, 2  (c) 1, 3  (d) 3, 1
5. The approximate ratio of D : H in naturally occurring hydrogen is …………..
(a) 1 : 2  (b) 1 : 1.5  (c) 1 : 6000  (d) 1 : 10⁻¹⁵
6. Which one of the following is not used to electrolyse heavy water to get Deuterium?
(a) Sodium  (b) Red hot iron  (c) Tungsten  (d) Phosphorus
7. Which compounds are formed when sodium deuteride reacts with water?
(a) NaOD + H₂  (b) NaOH + D₂  (c) NaOH + HD  (d) Na + D₂O
8. Which metal is used in the reaction between deuterium and ethylene?
(a) Na  (b) Ni  (c) H₂  (d) Sn + HCl
9. Which isotope of hydrogen is used in nuclear fusion reaction?
(a) Protium  (b) Deuterium  (c) Tritium  (d) Heavy hydrogen
10. Which is the rare isotope of hydrogen?
(a) Protium  (b) Tritium  (c) Deuterium  (d) Heavy hydrogen
11. Tritium is prepared by bombarding beryllium with ………..
   (a) slow neutrons  (b) protons  (c) α-particle  (d) deuterons

12. Which one of the following is used as a radioactive tracer in chemical research?
   (a) Protium  (b) Deuterium  (c) Tritium  (d) Heavy water

13. What is the percentage of ortho and para hydrogen at 25 K?
   (a) 99 % and 1 %  (b) 1 % and 99 %  (c) 75 % and 25 %  (d) 25 % and 75 %

14. Which one of the following is used to absorb para hydrogen from ordinary hydrogen?
   (a) Animal charcoal  (b) Anthracite coal  (c) Activated charcoal  (d) Coke

15. Which one of the following method is not used to covert para hydrogen into ortho hydrogen?
   (a) By passing an electric discharge  (b) By heating to 800°C
   (c) By mixing with atomic hydrogen  (d) By heating with Cl₂

16. Which colour is produced when sodium burnt in Bunsen flame?
   (a) Crimson red  (b) Lilac  (c) Yellow  (d) Blue

17. Which one of the following alkali metal is radioactive?
   (a) Lithium  (b) Sodium  (c) Potassium  (d) Francium

18. Sodium on burning in air forms ………
   (a) Na₂O  (b) Na₂O₂  (c) Na₂  (d) Na₂O₂

19. Sodium amalgam is used as ………
   (a)oxidising agent  (b) reducing agent  (c) dehydrating agent  (d) decarboxylating agent

20. In the preparation of copper and Nickel, Lithium is used as ………
   (a) Catalyst  (b) deoxidiser  (c) oxidiser  (d) promoter

21. Which compounds are used in the treatment of gout?
   (a) LiAlH₄  (b) Li₂O  (c) Lithium citrate and salicylate  (d) Lithium hydroxide

22. Which compound of Lithium is used as a reducing agent?
   (a) LiAlH₄  (b) Li₂O  (c) LiCl  (d) Li₂O₂

23. Sodium forms ………
   (a) Octahedral  (b) Pyramidal  (c) Tetragonal  (d) Rhombic

6. Group 2-s-Block Elements

1. Which one of the following does not belong to group 2 elements?
   (a) Sodium  (b) Calcium  (c) Barium  (d) Beryllium

2. Which one of the alkaline earth metal is radioactive?
   (a) Beryllium  (b) Radium  (c) Strontium  (d) Calcium

3. What is the general outer electronic configuration of alkaline earth metals?
   (a) ns² np⁶  (b) ns¹  (c) ns²  (d) ns² np¹⁻⁵

4. Which one of the following has the highest ionisation energy?
   (a) Ba  (b) Mg  (c) Ca  (d) Be

5. The divalent ion of group 2 elements are ………
   (a) Ferromagnetic  (b) Diamagnetic  (c) Paramagnetic  (d) None of these

6. The colour of the flame produced by strontium is ………
   (a) Red  (b) Green  (c) Yellow  (d) Blue
7. Which one of the following is called Epsom salt?
(a) CuSO₄ . 5H₂O   (b) FeSO₄ . 7H₂O   (c) MgSO₄ . 7H₂O   (d) ZnSO₄ . 7H₂O
8. Identify the third most abundant dissolved ion in the ocean …………………
(a) Mg²⁺  (b) Be²⁺  (c) Ca²⁺  (d) Ra²⁺
9. Which one of the following is used in flash light photography and in fire-works?
(a) Ca  (b) Mg  (c) Ba  (d) Ra
10. Which one of the following is used as a purgative?
(a) Calcium oxide  (b) Beryllium chloride  (c) Magnesium sulphate  (d) Copper sulphate
11. Which compound is used as a drying agent for gases and alcohol?
(a) Calcium oxide  (b) Magnesium sulphate  (c) Plaster of paris  (d) Gypsum
12. ………………… is used in refining sugar and white washing.
(a) CaO  (b) CaCO₃  (c) CaCl₂  (d) CaSO₄ . 2H₂O
13. Which compound is used as a retardant for the setting of cement?
(a) Quick lime  (b) Gypsum  (c) Plaster of Paris  (d) Epsom salt
14. The process of setting of plaster of paris is catalysed by …………………
15. Which one of the following is used in making false ceilings?
(a) Gypsum  (b) Plater of paris  (c) Epsom slat  (d) Quick lime

7. p-Block Elements
1. The general electronic configuration of group 17 is …………………
(a) ns² np¹  (b) ns² np⁵  (c) ns² np⁶  (d) ns² np⁷
2. ns² np¹⁶ is the general outer electronic configuration of ………… elements.
(a) s-block  (b) d-block  (c) f-block  (d) p-block
3. The electronic configuration of boron group is …………………
(a) ns²  (b) ns² np²  (c) ns² np⁵  (d) ns² np⁶
4. The most stable oxidation state of thallium is …………………
(a) +1  (b) +2  (c) +3  (d) +4
5. The oxides of metallic elements of p-block is …………………
(a) acidic  (b) basic  (c) amphoteric  (d) neutral
6. Which one of the following oxide is amphoteric oxide?
(a) Bi₂O₃  (b) SO₃  (c) GeO₂  (d) Cl₂O₇
7. Which one of the following oxide is the most acidic oxide?
(a) Al₂O₃  (b) SiO₂  (c) P₄O₁₀  (d) Cl₂O₇
8. Which is the correct order of stability of hydrides?
(a) PH₃ > AsH₃ > NH₃ > SbH₃ > BiH₃  (b) NH₃ < PH₃ < AsH₃ < SbH₃ < BiH₃
(c) NH₃ > PH₃ > AsH₃ > SbH₃ > BiH₃  (d) BiH₃ > SbH₃ > AsH₃ > PH₃ > NH₃
9. In group 16, which element form the most basic oxide?
(a) Carbon  (b) Silicon  (c) Germanium  (d) Lead
10. The formula of Razorite is …………………
(a) Na₂B₂O₇  (b) Na₂B₄O₇ . 4H₂O  (c) Na₂B₄O₇ . 10H₂O  (d) Ca₂B₆O₁₁ . 5H₂O
11. 2Mg₃B₈O₁₅ . MgCl₂ is named as …………………
(a) Razorite  (b) Borax  (c) Boracite  (d) Colemanite

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12. Which one of the product is formed when amorphous boron dissolves in concentrated sulphuric acid?
   (a) Boron trioxide  (b) Boron sulphate  (c) Boron sulphide  (d) Boric acid

13. Boron is a powerful ………….
   (a) conductor of electricity (b) reducing agent (c) oxidising agent (d) dyhydrating agent

14. Which one of the following compound is used as a flux in welding metals?
   (a) Boron trioxide  (b) Borax  (c) Boric acid  (d) Boron trifluoride

15. Borax bead test is used to identify ………………….
   (a) acid radical  (b) metallic radical  (c) complex salt  (d) double salt

16. The colour produced by chromium in oxidising flame of borax bead test is …………..
   (a) blue  (b) red  (c) green  (d) grey

17. The compound formed when B₂O₃ reacts with water is ………….
   (a) Boric acid  (b) Boron  (c) Boron hydroxide  (d) Boron hydride

18. In diborane, the hybridised state of boron is …………….
   (a) sp  (b) sp²  (c) sp³  (d) sp³d

19. Which one of the following does not belong to 14th group of the periodic table?
   (a) Carbon  (b) Boron  (c) Silicon  (d) Germanium

20. Which one of the following is not an allotropic from of carbon?
   (a) Diamond  (b) Graphite  (c) Coal  (d) Alabaster

21. Which one of the following is belong to amorphous varieties of carbon?
   (a) Coke  (b) Graphite  (c) Diamond  (d) None of these

22. The bonds present in diamond are strongly ………….. bonds.
   (a) ionic  (b) electrovalent  (c) covalent  (d) dative

23. Which one of the following is a metalloid?
   (a) Carbon  (b) Germanium  (c) Silicon  (d) Lead

24. B₄C is an example of ………….. hydride.
   (a) ionic  (b) metallic  (c) interstitial  (d) covalent

25. Which one of the compound is used in the manufacture of viscose rayon and cellophane?
   (a) CO₂  (b) Cs₂  (c) CO  (d) SiC

26. Which compound is named as salt petre?
   (a) NaNO₃  (b) KCl  (c) KNO₃  (d) NH₄NO₃

27. Which compound is used as a refrigerant in ice-plants?
   (a) Ammonia  (b) Nitric oxide  (c) Nitric acid  (d) Nitrous oxide

28. The oxy acid used in the purification of gold and silver is …………..
   (a) HNO₂  (b) HNO₃  (c) H₂SO₄  (d) H₂SO₃

29. Which compound is used in pickling of stainless steel?
   (a) Nitrous acid  (b) Nitrous oxide  (c) Nitric acid  (d) Nitrogen pentoxide

30. Which is used for bleaching oils, ivory, flour and starch?
   (a) O₂  (b) O₃  (c) CO₂  (d) CO

8. The Solid State-I

1. The solid in which the atoms are held together by strong cohesive forces is known as ………….
   (a) isotropic solid  (b) crystalline solid  (c) pseudosolid  (d) supercooled liquid
1. Which one of the following is not a crystalline solid?
   (a) Glass       (b) Sugar       (c) Sodium chloride       (d) Sulphur

2. Which one of the following is an anisotropic solid?
   (a) Glass       (b) Plastic       (c) Sodium chloride       (d) Rubber

3. Amorphous solid is otherwise known as ...................
   (a) pseudo solid       (b) crystalline solid       (c) true solid       (d) anisotropic solid

4. Which one of the following is a isotropic solid?
   (a) Sodium chloride       (b) Sugar       (c) Caesium chloride       (d) Plastic

5. If the physical properties are different in different directions, the phenomenon is known as ...............
   (a) anisotropy       (b) isotropy       (c) crystallography       (d) None of these

6. If the thermal properties and electrical properties of solid are same in all directions, the phenomenon is referred as ...............
   (a) anisotropy       (b) isotropy       (c) crystallography       (d) None of these

7. Which one of the crystal has all faces alike?
   (a) Galena       (b) Plastic       (c) Glass       (d) Fluorospar

8. In Galena, all faces are ..................
   (a) not alike       (b) alike       (c) same       (d) equivalent

9. The primitives of a unit cell are known as ..................
   (a) characteristic intercepts       (b) faces       (c) axes       (d) interfaces

10. Which one of the following is not the type of unit cell?
    (a) Cubic       (b) Square planar       (c) Monoclinic       (d) Hexagonal

11. In a simple cubic unit cell, the angle between each of axes is ...............
    (a) 120°       (b) 60°       (c) 90°       (d) 180°

12. The number of atoms in a body centred cubic cell is ...............
    (a) 1       (b) 3       (c) 4       (d) 2

13. The number of atoms per unit cell in simple cubic structure is ...............
    (a) 2       (b) 4       (c) 1       (d) 3

14. At which temperature, CsCl structure changes to NaCl structure?
    (a) 100 K       (b) 273 K       (c) 373 K       (d) 760 K

15. Caesium chloride structure has ...............
    (a) body centred cubic system       (b) face centred cubic system
    (c) simple cubic system       (d) None of these

16. The lattice points can be broken up into a number of ...............
    (a) molecules       (b) atoms       (c) ions       (d) unit cells

9. Gaseous State

1. A substance is made to exist in any one of the three states by varying ...............
   (a) temperature       (b) pressure       (c) Both (a) and (b)       (d) None of these

2. A real gas behave as an ideal gas at ...............
   (a) low T and high P       (b) high T and low P       (c) optimum temperature       (d) optimum pressure

   The kinetic energy of gaseous molecules is given by ...............
   (a) mc²       (b) mv²       (c) 2mc²       (d) \(\frac{1}{2}mv²\)

3. Volume of a gas is determined by its ...............

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(a) pressure (b) temperature (c) number of moles (d) All

4. When the number of moles of gas increases ……………
(a) pressure increases (b) temperature increases (c) temperature decreases (d) pressure decrease

5. Which one of the equation represent Boyle’s law?
(a) \( P \propto T \) (b) \( V \propto T \) (c) \( \frac{P}{T} = \text{constant} \) (d) \( PV = \text{constant} \)

6. Which one of the equation represent Charle’s law?
(a) \( P_1 V_1 = P_2 V_2 \) (b) \( \frac{P}{V} = \text{constant} \) (c) \( \frac{P}{V} = \text{constant} \) (d) \( \frac{P}{T} = \text{constant} \)

7. The value of normal atmospheric pressure ……………
(a) 10 atm. pressure (b) \( 1.013 \times 10^{-5} \) Nm\(^{-2}\) (c) \( 1.013 \times 10^3 \) Nm\(^{-2}\) (d) \( 1.013 \times 10^{-3} \) Nm\(^{-2}\)

8. Which one of the following is the value of \( R \) in C.G.S. system?
(a) \( 0.0821 \) dm\(^3\) atm. K\(^{-1}\) mol\(^{-1}\) (b) \( 8.314 \times 10^7 \) erg. K\(^{-1}\) mol\(^{-1}\) (c) \( 8.314 \) joule K\(^{-1}\) mol\(^{-1}\) (d) \( 1.987 \) cals K\(^{-1}\) mol\(^{-1}\)

9. The value of \( R \) gas contant in M.K.S. system is ……………
(a) \( 0.0821 \) dm\(^3\) atm. K\(^{-1}\) mol\(^{-1}\) (b) \( 8.314 \times 10^7 \) erg. K\(^{-1}\) mol\(^{-1}\) (c) \( 8.314 \) joule K\(^{-1}\) mol\(^{-1}\) (d) \( 1.987 \times 10^7 \) erg. K\(^{-1}\) mol\(^{-1}\)

10. Partial pressure is calculated by the formula ……………
(a) \( \text{Total pressure} \) (b) \( \text{Total pressure} \times \text{Mole fraction} \) (c) \( \text{Pressure} \times \text{Number of moles} \) (d) \( \text{Total pressure} \times \text{Molecular mass} \)

11. The value of excluded volume is equal to ……………
(a) \( V \times n \) (b) \( V \times 2n \) (c) \( 4 \times V \) (d) Volume of 1 molecule

12. \( \frac{a}{V^2} \) is called ……………
(a) internal pressure (b) excluded volume (c) increased volume (d) None of these

13. The unit of Vander waal’s constant ‘\( a \)’ is ………
(a) dm\(^3\) mol\(^{-1}\) (b) atm. dm\(^6\) mol\(^{-2}\) (c) atm. dm\(^3\) mol\(^{-1}\) (d) mol\(^{-1}\)

14. The unit of excluded volume is ……………
(a) dm\(^3\) mol\(^{-1}\) (b) atm. dm\(^6\) mol\(^{-1}\) (c) atm. dm\(^3\) mol\(^{-1}\) (d) mol\(^{-1}\)

15. The critical temperature of carbondioxide is ………
(a) 273 K (b) 304.1 K (c) 100°C (d) 100 K

16. What happens at inversion temperature?
(a) Fall in temperature (b) Rise in temperature (c) Cooling take place (d) Neither tall nor rise in temperature

17. Which principle is involved in Linde’s method?
(a) Joule Thomson effect (b) Adiabatic expansion (c) Adiabatic demagnetization (d) All of these

18. What is the low temperature produced by adiabatic demagnetisation?
(a) \( 10^{-2} \) K (b) \( 10^{-4} \) K (c) \( 10^{-1} \) K (d) \( 10^{-6} \) K

19. Which substance is used for adiabatic demagnetisation method?
(a) ceric sulphate (b) Iron sulphate (c) Gadolinium sulphate (d) Copper sulphate

10. Chemical Bonding

1. Which one of the following is an example for homonuclear diatomic molecule?
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2. Which one of the following is an example for heteronuclear diatomic molecule?
(a) HCl  (b) O_3  (c) O_2  (d) HCHO
3. Phosphorus is an example of ………. molecule.
(a) homonuclear diatomic  (b) homonuclear polyatomic
(c) heteronuclear diatomic  (d) heteronuclear polyatomic
4. Which one of the following compound contains an electrovalent bond?
(a) CO_2  (b) CCl_4  (c) NH_3  (d) NaCl
5. Identify the nature of the bond present in oxygen molecule …………
(a) Electrovalent bond  (b) Metallic bond  (c) Covalent bond  (d) Dative bond
6. Homonuclear diatomic molecules possess ……………
(a) ionic bond  (b) covalent bond  (c) metallic bond  (d) co-ordinate covalent bond
7. The lattice enthalpy of NaCl is ……………
(a) -788 kJ mol^{-1}  (b) +788 kJ mol^{-1}  (c) -399 kJ mol^{-1}  (d) +399 kJ mol^{-1}
8. Which is used in the determination of lattice enthalpy?
(a) Octet rule  (b) Law of mass action  (c) Born-Haber cycle  (d) Lawis theory
9. The interatomic bond formed due to the overlap of atomic orbitals of electrons is known as …………..
(a) ionic bond  (b) electrovalent bond  (c) co-ordinate covalent bond  (d) covalent bond
10. The number and nature of bonds present in ethane molecule are ……………
(a) 5 sigma bond and 1 pi bond  (b) 6 C–H sigma bond and one C=C sigma bond
(c) 4 C–H sigma bond and one C=C bond  (d) 2 C–H sigma bond and one C≡C bond
11. Carbon tetrachloride is a ……………
(a) covalent non polar molecule  (b) ionic polar molecule
(c) electrovalent rigid molecule  (d) co-ordinate covalent molecule
12. Which is the general trend in polarising power of cations of I group elements?
(a) Cs^+ > Rb^+ > K^+ > Na^+ > Li^+  (b) Li^+ > Na^+ > K^+ > Rb^+ > Cs^+
(c) Na^+ < Li^+ < K^+ < Cs^+ < Rb^+  (d) Li^+ < Na^+ > K^+ < Rb^+ > Cs^+
13. Which one of the following is not a dipolar molecule?
(a) H–F  (b) H–Cl  (c) H_2O  (d) NH_3
14. What is the shape of Beryllium chloride molecule?
(a) Linear  (b) Pyramidal  (c) Square planar  (d) Tetrahedral
15. Tetrahedral shape is possessed by which molecule?
(a) Ammonia  (b) Water  (c) Methane  (d) SO_2
16. Which molecule is represented by AB_3E type?
(a) SO_2  (b) H_2O  (c) NH_3  (d) CH_4
17. H_2O is represent by which molecular type?
(a) AB_2E  (b) AB_2E_2  (c) AB_3E  (d) AB_2
18. The molecule SF_6 has geometrical arrangement as ……………
(a) linear  (b) square planar  (c) octahedral  (d) pyramidal
19. The bond angle in water molecule is …………..
(a) 104.5°  (b) 109°28’  (c) 107°  (d) 90°
20. The molecular geometry of BF_3 is ……………
21. What is the bond angle in ammonia?
   (a) 104°  (b) 109°28’  (c) 107°  (d) 120°

22. How many canonical forms are exhibited by benzene?
   (a) 1  (b) 2  (c) 6  (d) 5

23. Nickel tetracarbonyl exists in ................ geometry.
   (a) linear  (b) trigonal  (c) pyramid  (d) square planar

11. Colligative Properties
   1. Isotonic solutions are the solutions having the same ............
      (a) surface tension  (b) vapor pressure  (c) osmotic pressure  (d) viscosity

   2. A colligative property is ............
      (a) osmotic pressure  (b) boiling point  (c) vapour pressure  (d) electrical conductivity

   3. At high altitude, the boiling point of water decreases because, ............
      (a) the atmospheric pressure is high  (b) the temperature is low
      (c) the atmospheric pressure is low  (d) the temperature is high

   4. The boiling point of a solvent containing a non-volatile solute ............
      (a) is depressed  (b) is elevated  (c) does not change  (d) None of the above

   5. The colligative properties of dilute solution depend on ............
      (a) the nature of the solute  (b) the nature of the solvent
      (c) the number of particles of solute  (d) number of particles of solvent

   6. Which of the following is not a colligative property?
      (a) Depression in freezing point  (b) Elevation in boiling point
      (c) Vapour pressure  (d) Osmotic pressure

   7. A pressure cooker reduces cooking time because, ............
      (a) heat is more evenly distributed  (b) the high pressure tenderizes the food
      (c) the boiling point of water inside the cooker is depressed
      (d) the boiling point of water inside the cooker is depressed

   8. The osmotic pressure of equimolar solutions of glucose, sodium chloride and barium chloride will be in the order ............
      (a) BaCl₂ > NaCl > Glucose  (b) BaCl₂ > Glucose > NaCl
      (c) Glucose > BaCl₂ > NaCl  (d) NaCl > BaCl₂ > Glucose

   9. Which of the following aqueous solutions would exhibit abnormal osmotic pressure?
      (a) 0.1 M sucrose  (b) 0.1 M glucose  (c) 0.1 M urea  (d) 0.1 M NaCl

   10. At the same temperature, 0.1 M solution of urea is isotonic with .......... solution.
      (a) 0.1 M glucose  (b) 0.1 M NaCl  (c) 0.05 M urea  (d) 0.1 M BaCl₂

   11. The osmotic pressure of a solution with a definite concentration ............
      (a) varies directly as the volume and temperature
      (b) varies inversely as the temperature
      (c) varies inversely as the volume and directly as the temperature
      (d) independent of temperature but varies inversely as the volume

   12. Which of the following method is used for the determination of osmotic pressure?
      (a) Cottrell method  (b) Lands berger method
      (c) Beckman method  (d) Berkley and Hartley method

   13. Sea water is converted into freshwater based upon the phenomenon of ............
(a) plasmolysis  
(b) sedimentation  
(c) reverse osmosis  
(d) diffusion

14. Calculate the osmotic pressure of 6% urea at 300 K (molar mass = 60) (R = 0.082 1 atm. mol$^{-1}$ . K$^{-1}$)
   (a) 22.4 atm  
   (b) 24.6 atm  
   (c) 2.46 atm  
   (d) 27.3 atm

15. Which of the following properties does not depend upon the number of solute particles?
   (a) Osmotic pressure  
   (b) Elevation in boiling point  
   (c) Boiling point of the solvent  
   (d) Depression in freezing point

16. The flow of a solvent into a solution when two are separated by a semi-permeable membrane is called .........
   (a) diffusion  
   (b) osmosis  
   (c) effusion  
   (d) mixing

17. Which of the following effect is not observed when a non-volatile solute is added to a solvent?
   (a) Decrease in vapour pressure  
   (b) Elevation of boiling point  
   (c) Lowering of freezing point  
   (d) Increase of freezing point

18. The colligative properties of a non electrolytic solution depend on ......................
   (a) number of solute molecules  
   (b) nature of solute molecules  
   (c) both number and nature of solute molecules  
   (d) None of the above

19. Which one of the following expression indicates Raoult’s law?
   (a) $\Delta p = p_o - p$  
   (b) $\frac{p_o - p}{p_o} = X_1$  
   (c) $p = p_o X_1$  
   (d) $p^o - p = X_2$

20. The relative lowering of vapour pressure is equal to ..............
   (a) mole fraction of solvent  
   (b) number of moles of solute  
   (c) number of moles of solvent  
   (d) mole fraction of solute

21. The whole scale of Beckmann thermometer covers only ........
   (a) 100 K  
   (b) 273 K  
   (c) 6 K  
   (d) 0.01 K

22. The value of molal depression constant of champhor is ..............
   (a) 1.86  
   (b) 7.00  
   (c) 20.20  
   (d) 37.70

23. 1.86 K kg mol$^{-1}$ is the $K_f$ value of ..............
   (a) water  
   (b) camphor  
   (c) naphthalene  
   (d) phenol

24. Which ions are responsible for the maintenance of osmotic pressure in cells of organism?
   (a) Fe$^{3+}$ and Fe$^{2+}$  
   (b) Na$^+$ and K$^+$  
   (c) Cl$^-$ and Br$^-$  
   (d) Al$^{3+}$ and Be$^{2+}$

25. In Berkley Hartley method, the outertube is made of ..............
   (a) iron  
   (b) Semi-ermeable membrane  
   (c) gun metal  
   (d) cupric ferrocyanide

12. Thermodynamics-I

1. While investigating a reaction, the system is taken to be ..............
   (a) the reactants only  
   (b) the products only  
   (c) the reactants and products  
   (d) the reaction vessel

2. A cup filled with water and uncovered but placed in a very large cupboard is an example of ..............
   (a) open system  
   (b) closed system  
   (c) isolated system  
   (d) insulated system

3. A stoppered thermos flask completely full of hot coffee is an example of ..............
   (a) open system  
   (b) closed system  
   (c) an isolated system  
   (d) None of these

4. To determine heat of combustion it is essential to provide ..................
(a) O₂ at low pressure  (b) 1 mole O₂
(c) excess of O₂ at a good pressure  (d) O₂ diluted by inert gas

5. Which of the following does not cause environmental pollution?
(a) Combustion of fossil fuels  (b) Photosynthesis in plants
(c) Non-biodegradable waste  (d) Pesticide residue

6. Which of the following enthalpies is always negative?
(a) Enthalpy of formation  (b) Enthalpy of solution
(c) Enthalpy of combustion  (d) Enthalpy of melting

7. \( \Delta H \) and \( \Delta U \) for the reaction \( S_{(s)} + 3/2O_2\text{(_g)} \rightarrow SO_3\text{(_g)} \) are related as .................. 
(a) \( \Delta H = \Delta U + RT \)  (b) \( \Delta H = \Delta U - 0.5RT \)  (c) \( \Delta H = \Delta U - RT \)  (d) \( \Delta H = \Delta U - 3/2 RT \)

8. A system which can exchange mass as well as energy with its surrounding is said to be an ............
(a) isolated system  (b) open system  (c) closed system  (d) inert system

9. Enthalpy H can be defined as ................
(a) \( H = U - PV \)  (b) \( H = P + U + V \)  (c) \( H = U + PV \)  (d) \( H = U - TS \)

10. In an isothermal expansion of an ideal gas against vacuum, the work involved is .......
(a) zero  (b) maximum  (c) minimum  (d) None of these

11. In a spontaneous change, a system undergoes ............
(a) lowering of free energy  (b) lowering of entropy
(c) increase in internal energy  (d) no energy change

12. In the combustion of benzene at 0°C, the change in the number of moles \( \Delta n_{(_g)} \) is .......
(a) 1.5  (b) -1.5  (c) 0  (d) 3

13. The enthalpies of all elements in their standard state is assumed as ...........
(a) zero at 25°C  (b) unity at all temperature  (c) zero at 0K  (d) zero at 0°C

14. Heat of formation of a compound is equal in magnitude to its heat of ...........
(a) reaction  (b) combustion  (c) decomposition to its elements  (d) dilution

15. In an isolated system, there is no exchange of ............ with the surroundings
(a) matter  (b) energy  (c) heat  (d) energy and matter

16. Heat exchanged in a chemical reaction at constant temperature and at constant pressure is termed as ............
(a) internal energy  (b) enthalpy  (c) inherent energy  (d) entropy

17. If the heat content of Y is greater than the of X, the reaction \( X \rightarrow Y \) is ............
(a) endothermic  (b) exothermic  (c) instantaneous  (d) isothermal

18. Identify the energy change taking place in steam engine ............
(a) Light energy to heat energy  (b) Heat energy to mechanical energy
(c) Solar energy to electrical energy  (d) Chemical energy to electrical energy

19. Which system permits the exchange of energy but not mass across the boundary with its surroundings?
(a) Isolated system  (b) Open system  (c) Closed system  (d) None of these

20. Which one of the following is an extensive property?
(a) Refractive index  (b) Surface tension  (c) Density  (d) Internal energy

21. Which one of the following is not an extensive property?
(a) Volume  (b) Temperature  (c) Mass  (d) Energy

22. Which one of the following is an intensive property?
1. The equilibrium constant for the reaction $C(s) + CO_2(g) \rightarrow CaO(s) + CO_2(g)$ the $K_c$ is equal to ..............

(a) $\frac{[CO_2]}{[CO]}$  
(b) $\frac{[CO]}{[CO_2]}$  
(c) $\frac{[CO_2]^2}{[C]}$  
(d) $\frac{[C][CO_2]}{[CO]^2}$

2. The equilibrium constant $K_c$ for the reaction $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$ is equal to ....

(a) $\frac{[CaO][CO_2]}{[CaCO_3]}$  
(b) $[CO_2]$  
(c) $\frac{[CaO]}{[CaCO_3]}$  
(d) $\frac{[CaO]}{[CO_2]}$

3. At chemical equilibrium ..................

(a) concentration of reactants > concentration of products  
(b) concentration of reactants < concentration of products  
(c) concentration of reactants = concentration of products  
(d) concentration of products < concentration of reactants

4. The reaction between silver nitrate and sodium chloride is an example of ...... reaction

(a) reversible  
(b) homogeneous  
(c) irreversible  
(d) slow

5. The transition of sulphur (Rh) to sulphur (m) is an example of ............. equilibrium

(a) Solid-liquid  
(b) liquid-liquid  
(c) solid-solid  
(d) solid-gas

6. Ammonia manufacture by Haber’s process is an example of ............. equilibrium

(a) liquid-liquid  
(b) solid-solid  
(c) solid-gas  
(d) gas-phase

7. Which one of the following is an example of liquid phase equilibrium?

(a) Ammonia manufacture  
(b) Decomposition of calcalcium carbonate  
(c) Esterification reaction  
(d) Sulphuric acid manufacture

8. $CaCO_3$? CaO + CO$_2$ is an example of which equilibrium?

(a) Heterogeneous equilibrium  
(b) Homogeneous equilibrium  
(c) Liquid phase equilibrium  
(d) Solid-solid equilibrium

9. What is the value of $K_c$ for the reaction $3Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4(s) + 4H_2(g)$

(a) $K_c = \frac{[Fe_3O_4][H_2]^4}{[Fe]^3[H_2O]^4}$  
(b) $K_c = \frac{[H_2]^4}{[H_2O]^4}$  
(c) $K_c = \frac{[Fe_3O_4]}{[Fe]^3[H_2O]^4}$  
(d) $K_c = \frac{[Fe_3O_4][H_2]}{[Fe][H_2O]}$

10. In the heterogeneous equilibrium, $CaCO_3(s)$? CaO + CO$_2(g)$ the value of $K_c$ and $K_p$ are .....................

(a) $K_c = K_p = [CO_2]$  
(b) $K_c = [CO_2]; K_p = pCO_2$  
(c) $K_c = [CaO][CO_2]; K_p = pCO_2PCaO$  
(d) $K_c = [CaCO_3]; K_p = PCaCO_3$


1. Radioactive decay follows ............. order kinetics

(a) zero  
(b) first  
(c) second  
(d) third

2. C$^{14}$ has a half-life of 5760 years. 100mg of sample of C$^{14}$ is reduced to 25mg in .............. years.
3. The term \( \frac{d[c]}{dt} \) in a rate equation refers to ............
(a) the concentration of a reactant
(b) the change in concentration of the reactant with time
(c) the velocity constant of the reaction
(d) the decrease in concentration of the reactant with time

4. In 1.2 years, half of 64mg of a radioactive isotope decays. The amount present after 6 years is ...............?
(a) 0 mg  (b) 2 mg  (c) 8 mg  (d) 4 mg

5. A large increase in the rate of a reaction for a rise of temperature is due to the ...........
(a) increase in the number of collisions
(b) increase in the number of activated molecules
(c) shortening of mean free path  (d) lowering of activation energy

6. Which one of following factor does not influence the rate of reaction?
(a) Nature of reactants  (b) Concentration of reactants
(c) Temperature  (d) Molecularity of the reaction

7. The half-life of a first order reaction is ................ the initial concentration
(a) directly proportional to  (b) indirectly proportional to
(c) independent of  (d) equal to

8. The unit of rate is ...........
(a) sec\(^{-1}\)  (b) mol lit\(^{-1}\)  (c) mol litre\(^{-1}\) sec\(^{-1}\)  (d) mol dm\(^{-6}\) sec\(^{-1}\)

9. The unit of rate constant for first order reaction is ................
(a) sec\(^{-1}\)  (b) mol\(^{-1}\) dm\(^{3}\) sec\(^{-1}\)  (c) mol\(^{-1}\) dm\(^{3}\) sec\(^{-1}\)  (d) mol\(^{-1}\) sec\(^{-1}\)

10. The unit of rate constant of second order reaction is ...............
(a) sec\(^{-1}\)  (b) litre mol\(^{-1}\) sec\(^{-1}\)  (c) mol\(^{-2}\) litre\(^{2}\) sec\(^{-1}\)  (d) mol litre\(^{-1}\)sec\(^{-1}\)

11. Which one of the following is an example of first order reaction?
(a) Decomposition \( \text{N}_2\text{O}_5 \) to \( \text{NO}_2 \) and \( \text{O}_2 \)
(b) Acid hydrolysis of ester
(c) Saponification of an ester  (d) Thermal decomposition of acetaldehyde

12. Decomposition of \( \text{H}_2\text{O}_2 \) to \( \text{H}_2\text{O} \) and \( \text{O}_2 \) is an example of ............
(a) first order reaction  (b) second order reaction
(c) zero order reaction  (d) third order reaction

13. Which one of the following does not affect the order of a chemical reaction?
(a) Pressure  (b) Temperature  (c) Concentration  (d) Internal energy

14. Hydrolysis of sucrose in the presence of mineral acid is an example of ............
(a) zero order reaction  (b) first order reaction
(c) pseudo first order reaction  (d) second order reaction

15. Which one of the following is an example of pseudo first order reaction?
(a) Decomposition of \( \text{N}_2\text{O}_5 \) to \( \text{NO}_2 \) and \( \text{O}_2 \)
(b) Acid hydrolysis of ester
(c) Saponification of an ester  (d) Thermal decomposition of acetaldehyde

16. Which one of the following is a zero order reaction?
(a) \( \text{NH}_4\text{NO}_3 \rightarrow 2\text{H}_2\text{O} + \text{N}_2 \)
(b) \( \text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{C}_2\text{H}_5\text{OH} \)
(c) \( \text{H}_2(g) + \text{Cl}_2(g) \rightarrow 2\text{HCl}^{hv} \)
(d) \( \text{CH}_3\text{CHO} \rightarrow \text{CH}_4 + \text{CO} \)

17. Saponification of \( \text{ester} \) is an example of ............
(a) zero order reaction  (b) first order reaction
18. Which one of the following is an example of third order reaction?
(a) \[2\text{FeCl}_3 + \text{SnCl}_2 \rightarrow 2\text{FeCl}_2 + \text{SnCl}_4\]
(b) \[\text{CH}_3\text{CHO} \rightarrow \text{CH}_4 + \text{CO}\]
(c) \[2\text{N}_2\text{O}_5 \rightarrow 4\text{NO}_2 + \text{O}_2\]
(d) \[2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2\]

19. What is the order of thermal decomposition of acetaldehyde?
(a) 1
(b) 1.5
(c) 2
(d) 3

20. Which one of the following show fractional order?
(a) Addition reaction
(b) Substitution reaction
(c) Polymerisation
(d) Inversion of cane sugar
15. The functional group of aldehyde is ............
   (a) –OH       (b) –O–         (c) –COOH       (d) –CHO

16. The functional group of ester is ............
   (a) –COOH      (b) –COOR       (c) –CONH₂     (d) –COCl

17. The name of functional group –C – O – C – is ............
   \[\begin{array}{c}
   \text{O} \\
   \text{O}
   \end{array}\]
   (a) Carboxylic acid (b) acid amide (c) acid anhydride (d) acid chloride

18. Which one of the following group is named as secondary amine group?
   (a) –NH₂        (b) –NH     (c) –N       (d) –NO₂

19. The IUPAC name of CH₃ – CH₂ – CHO is ............
   (a) propanol   (b) propanone  (c) propanal (d) propionaldehyde

20. Which is the functional group of nitroso compound?
   (a) –NO        (b) –NO₂      (c) –NH₂      (d) N \equiv N
   \[\begin{array}{c}
   \text{CH₃}
   \end{array}\]

21. What is the IUPAS name of CH₃ – CH₂ – C – Cl ?
   \[\begin{array}{c}
   \text{CH₃}
   \end{array}\]
   (a) tertiary pentyl chloride (b) 1-chloro 1, 1 dimethyle propane
   (c) 3, 3 – dimethyl chloropropane (d) 2-methyl-2-chlorobutane

22. The IUPAC name of allyl chloride is ............
   (a) Chloropropene (b) 3 – chloro 2 – propene
   (c) 3 – chloro 1 – propene (d) 1 – chloro 3- propene

23. The structural formula of chloroethene is ...........
   \[\begin{array}{c}
   \text{Cl} \\
   \text{Cl}
   \end{array}\]
   (a) CH₂ = CH – CH₂Cl (b) CH₂ = CHCl (c) CH = CH (d) CH₃ – CH₂Cl

24. Which one of the following structure indicates 2-iodo-2-methyl propane?
   \[\begin{array}{c}
   \text{CH₃} \\
   \text{CH₃}
   \end{array}\]
   (a) CH₃ – C – CH₃ (b) CH₃ – CH – CH₂I
   (c) CH₃ – CH₂ – CH₂ – CH₂I (d) CH₃ – CH – CH₂ – CH₃

25. Which is the IUPAC name of isopropyl methyl ether?
   (a) 1- methoxy propane (b) Ethoxy ethane
   (c) Propoxy methane (d) 2-methoxy propane

26. Which one of the following structure indicates 2-methyl propanal?
   \[\begin{array}{c}
   \text{CH₃}
   \end{array}\]
   (a) CH₃ – CH – CHO (b) CH₃ – CH₂ – CH₂ – CHO

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27. Which is the correct structural formula of trimethyl amine?
(a) CH₃ – CH₂ – CH₂NH₂  
(b) CH₃ – CH₂ – N – CH₃
(c) CH₃ – N – CH₃  
(d) CH₃ – NH₂

28. n – butyl alcohol and isobutyl alcohol belong to which isomerism?
(a) Carbon chain isomerism  
(b) Position isomerism  
(c) Functional isomerism  
(d) Metamerism

29. Isobutyl alcohol and tert butyl alcohol belong to which isomerism?
(a) Carbon chain isomerism  
(b) Position isomerism  
(c) Functional isomerism  
(d) Metamerism

30. Propanoic acid and methyl acetate are the examples of ............
(a) Carbon chain isomerism  
(b) Position isomerism  
(c) Functional isomerism  
(d) Metamerism

31. The reaction between tert. butyl chloride and aqueous KOH is an example of .............
(a) Sᴺ¹ reaction  
(b) Sᴺ² reaction  
(c) E₁ reaction  
(d) E₂ reaction

32. The reaction between methane and chlorine follows ............ mechanism
(a) Electrophilic substitution  
(b) Nucleophilic substitution  
(c) Free radical substitution  
(d) Addition

33. Which mechanism is followed in the reaction of methyl chloride with aqueous KOH?
(a) Sᴺ¹  
(b) Sᴺ²  
(c) E₁  
(d) E₂

34. Which one of the following takes place by E₂ mechanism?
(a) tertiary butyl bromide + Alcoholic KOH  
(b) Primary alkyl chloride + Aqueous KOH  
(c) n – propyl bromide + Alcoholic KOH  
(d) Teritary butyl chloride + Aqueous KOH

35. Identify the electrophilic reagent among the following ................
(a) NH₃  
(b) H₂O  
(c) RNH₂  
(d) NO⁺₂

36. Which one of the following is a nucleophilic reagent?
(a) NH₃  
(b) AlCl₃  
(c) BF₃  
(d) FeCl₃

37. Carbon present in the carbonium ion is in ................. hybridized state
(a) sp  
(b) sp³  
(c) sp²  
(d) sp³d

38. Which one of the following has –I effect?
(a) CH₃  
(b) CH₃ – CH₂  
(c) (CH₃)₃C⁻  
(d) C₆H₅

39. Identify the group that has +I effect ............
(a) (CH₃)₃C⁻  
(b) –Br  
(c) –F  
(d) –OH

16. Purification of Organic Compounds

1. Organic compounds are insoluble in ..............
(a) ether  
(b) alcohol  
(c) water  
(d) benzene
2. Naphthalene and camphor are purified by .......... process
   (a) sublimation  (b) simple distillation
   (c) solvent extraction  (d) steam distillation
3. By which method diethyl ether and ethyl alcohol are separated and purified/
   (a) Sublimation  (b) simple distillation
   (c) Fractional crystallisation  (d) steam distillation
4. Which method is used to separate and purify benzene and toluene?
   (a) Sublimation  (b) Crystallisation
   (c) Fractional crystallisation  (d) Fractional distillation
5. Which compound is purified by steam distillation method?
   (a) Naphthalene  (b) Camphor  (c) Aniline  (d) Benzoic acid
6. Which organic compound is purified by distillation under reduced pressure?
   (a) Glycerol   (b) Camphor  (c) Diethyl ether  (d) Ethanol
7. Which one of the following compound is not used as an adsorbent?
   (a) Alumina  (b) Benzene  (c) Silica gel  (d) starch
8. Which one of the following can be used as stationary phase?
   (a) Ether  (b) Benzene  (c) Carbon tetrachloride  (d) Silica gel
9. Identify the compound that can be used as an adsorbent in TLC ...........
   (a) Silica gel  (b) Alumina  (c) Both (a) (or) (b)  (d) None of these
10. In descending paper chromatography, the mobile phase moves ........
    (a) upwards  (b) downwards  (c) horizontally  (d) None of these

17. Detection and Estimation of Elements
1. The colour of anhydrous copper sulphate is ............
   (a) blue  (b) White  (c) Green  (d) Violet
2. Carbon dioxide turns lime water milky due to the formation of ............
   (a) CaCO$_3$  (b) CaCl$_2$  (c) Ca(OH)$_2$  (d) CaO
3. Which element in the organic compound is detected indirectly?
   (a) Nitrogen  (b) Sulphur  (c) Hydrogen  (d) Oxygen
4. The molecular formula of ferric ferrocyanide is ............
   (a) Fe (CNS)$_3$  (b) Fe$_4$[Fe(CN)$_6$]  (c) Fe$_4$[Fe(CN)$_6$]$_3$  (d) Na$_4$[Fe(CN)${}_6$]
5. The colour produced by nitrogen and sulphur in an organic compound during
   Lassaigne’s test is ............
   (a) Prussian blue colour  (b) Violet colour
   (c) Black colour  (d) Blood red colour
6. Which element produce purple colour in Lassaigne’s test?
   (a) Nitrogen  (b) Sulphur  (c) Chlorine  (d) Bromine
7. Carbon and hydrogen are estimated by ............
   (a) Lassaigne’s test  (b) Carius method
   (c) Liebig’s combustion method  (d) Kjeldahl’s method
8. In Liebig’s combustion method, which compound is used to absorb CO$_2$?
   (a) Anhydrous CaCl$_2$  (b) Anhydrous AlCl$_3$  (c) Quicklime  (d) Caustic potash
9. In Liebig’s combustion method, anhydrous calcium chloride is used to absorb ............
   (a) water  (b) CO$_2$  (c) H$_2$  (d) O$_2$
10. Ajeldahl’s method is used to estimate ............
18. Hydrocarbons

1. Mesitylene is produced by the polymerization of .......... (a) Ethyne (b) Propyne (c) Ethene (d) Dimethyl acetylene

2. The compound formed when acetylene reacts with ammoniacal solution of cuprous chloride is .......... (a) Silver acetylide (b) copper acetylide (c) benzene (d) CH₃CHO

3. Which one of the following is used as a catalyst in cracking? (a) Metal (b) Zn + HCl (c) Metallic oxide (d) ROH

4. Alkene are otherwise known as as .......... (a) paraffins (b) olefins (c) acetylene (d) saturated hydrocarbon

5. The catalytic reduction of alkene is known as .......... reduction (a) Rosenmund’s (b) acid medium (c) Sabatier-senderens (d) Clemmenson

6. Which reagent is used to convert Grignard reagent to alkane? (a) Water (b) CO₂ (c) HCHO (d) CH₃CHO

7. The decarboxylation reaction is carried out by using .......... (a) quicklime (b) lime water (c) soda lime (d) caustic soda

8. Which one of the following method is not applicable for the preparation of alkane? (a) Wurtz reaction (b) Kolbe’s electrolytic method (c) Decarboxylation of fatty acid (d) Fitting reaction

9. Which catalyst is used in aromatization of alkane? (a) Ni + Al/NaOH (b) Cr₂O₃ + Al₂O₃ (c) Zn-Cu/ C₂H₂OH (d) Zn + HCl

10. The dipole moment of branched chain alkane is ................. (a) zero (b) maximum (c) twice (d) thrice

11. Which mechanism is followed by nitration of alkane? (a) S_N² (b) Electrophilic (c) Free radical (d) Ionic

12. Name the product formed when methane is oxidized by molybdenum trioxide .......... (a) Formic acid (b) Formaldehyde (c) Carbon dioxide (d) All of these

13. What reaction takes place when n-alkane is heated with anhydrous AlCl₃ and HCl at 300°C? (a) Isomerisation (b) Atomisation (c) Aromatization (d) Polymerisation

14. Which one of the catalyst is used in aromatization of alkane? (a) Ni + Al/NaOH (b) Cr₂O₃ + Al₂O₃ (c) Zn-Cu/ C₂H₂OH (d) Zn + HCl

15. Which reagent is used to convert ethane to acetic acid? (a) Cu (b) Ag (c) Ag₂O (d) KMnO₄

16. Which one of the following on ozonolysis yield glyoxal and formic acid? (a) Ethylene (b) Propyne (c) Ethyne (d) Dimethyl acetylene

17. What is the product formed when alcohols are heated with conc. H₂SO₄? (a) Alkane (b) Alkene (c) Alkyne (d) Aldehyde

18. Which reagent is used for dehydrohalogenation of alkyl halide? (a) Caustic soda (b) Lime water (c) Alcoholic KOH (d) Aqueous KOH

19. Which isomerism is present in but-1-ene and 2-methyl prop-1-ene? (a) Position isomerism (b) Metamerism (c) Chain isomerism (d) Tautomerism
20. Which one of the following product is formed when isobutylene is treated with HI?
(a) Isobutyl iodide  (b) Tert.butyl iodide  (c) n-butyl iodide  (d) sec.butyl iodide
21. Name the produce formed when propylene reacts with HBr in the presence of peroxide ............
(a) n-propyl bromide  (b) Isopropyl bromide  (c) sec. propyl bromide  (d) Ethyl bromide
22. Which one of the following gives only formaldehyde on ozonolysis?
(a) Propylene  (b) Acetylene  (c) 1-butene  (d) Ethylene
23. The reducing agent used in the conversion of an ozonide to carbonyl compound is ..... 
(a) H₂O₂  (b) H₂O  (c) Zn + CH₃COOH  (d) Ni
24. Which one of the following is used in making printing ink and black pigments?
(a) Ethane  (b) Carbon black  (c) Ethylene  (d) Acetylene
25. Which one of the following is used for ripening of fruits?
(a) Ethylene  (b) Ethane  (c) Ethyne  (d) Ethanol
26. Name the synthetic rubber prepared from ethylene dichloride ............
(a) GRA rubber  (b) Buna-N-rubber  (c) Neoprene  (d) Thiokol
27. Which product is formed when cyclohexane is passed overheated nichrome wire?
(a) Butylene  (b) But-2-ene  (c) Buta-1, 3-dine  (d) Isobutylene
28. The explosion by direct combination of acetylene with chlorine can be prevented by .
(a) hydrolysis  (b) dehydrohalogenation  (c) using a metal chloride catalyst  (d) oxidation
29. Which one of the following is formed when acetylene is hydrolysed?
(a) Vinyl alcohol  (b) Acetaldehyde  (c) Ethyl alcohol  (d) None of these

19. Aromatic Hydrocarbons
1. Benzene was isolated by Faraday from the gas obtained from ............
   (a) coal tar  (b) petroleum  (c) the pyrolysis of whale oil (d) acetylene
2. Benzene was first synthesized by ................
   (a) Faraday  (b) Hoffmann  (c) Berthlot  (d) Arrhenius
3. Which product is formed by the decarboxylation of benzoic acid?
   (a) Benzene  (b) Toluene  (c) Benzoyl peroxide  (d) Mesitylene
4. The aromatic compound are found in the female steroidal harmone .............
   (a) morphine  (b) estrone  (c) penicillin  (d) aspirin
5. Which is the first member in the aromatic series of the compounds?
   (a) Toluene  (b) Xylene  (c) Naphthalene  (d) Benzene
6. Which one of the following is a meta directing group?
   (a) –OH  (b) –NH₂  (c) –X  (d) –NO₂
7. Which one of the following is ortho and para directing group?
   (a) –NO₂  (b) –CHO  (c) –NH₂  (d) –COOH
8. Which one of the following is the product when phenol is distilled with zinc dust?
   (a) Anisole  (b) Benzene  (c) Phenoxide  (d) Toluene
9. The formation of toluene from bromo benzene and bromo methane is known as ............ reaction
   (a) Friedel-Craft’s  (b) Fitting  (c) Wurtz-fitting  (d) Wurtz
10. Which one of the following is very unreactive even in the presence of a catalyst?
    (a) Chlorine  (b) Iodide  (c) Bromine  (d) Fluorine
11. The bond length of C-C in benzene ring is equal to ............
(a) 1.54 Å (b) 1.34 Å (c) 1.39 Å (d) 1 Å

12. The hybridization of carbon atom in benzene is ............
(a) sp³ (b) sp² (c) sp (d) sp³d

13. Which one of the following is used as a fuel along with petrol?
(a) Benzene (b) Coal (c) Coke (d) Naphthalene

14. Which one of the following is a monocyclic aromatic hydrocarbon?
(a) Phenol (b) Toluene (c) Naphthalene (d) Anthracene

15. Which one of the following is a polycyclic aromatic hydrocarbon?
(a) Benzene (b) Aniline (c) Anthracene (d) Toluene

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20. Organic Halogen Compounds

1. The organic compound used in the treatment of Typhoid fever is ............
(a) Chloromycetin (b) thyroxin (c) chloroquine (d) halothane

2. Thyroxine is used for the treatment of ...........
(a) typhoid (b) goiter (c) malaria (d) surgery

3. Which medicine is used to curve malaria?
(a) Chloromycetin (b) Thyroxine (c) Chloroquine (d) Halothene

4. Which compound is used as an anesthetic during surgery?
(a) Halothane (b) Chloroquine (c) Chloromycetin (d) Thyroxine

5. The functional group of primary alkyl halide is ............
(a) > CH X (b) –CH₂ X (c) > CX (d) –CHCl

6. The IUPAC name of \( \text{CH}_3 \text{–CH–CH}_3 \) is .............
(a) isobutyl bromide (b) 2-methyl-3-bromopropane
(c) 1-bromo-2-methyl propane (d) 2-methyl propyl bromide

7. The structural formula of propylidene chloride is ............
(a) \( \text{CH}_3 \text{–CH–CH}_3 \) (b) \( \text{CH}_3 \text{–CH} – \text{CHCl} \)
(c) \( \text{CH}_3 \text{–CH}_2 \text{–CH}_2\text{Cl} \) (d) \( \text{CH}_3 \text{–C–CH}_3 \)

8. The IUPAC name of \( \text{I} \) is .............
(a) isopropyl iodide (b) n-propyl iodide (c) 1-iodo propane (d) 2-iodo propane

9. 2-bromo-2-methyl butane is .............
(a) \( \text{CH}_3 \text{–CH–CH}_2 \text{–CH}_3 \) (b) \( \text{CH}_3 \text{–C–CH}_2 \text{–CH}_3 \)

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(c) \( CH_3 - C - CH_3 \)  
(d) \( CH_3 - CH - CH_2 Br \)

10. \( Br - CH_2 - CH - CH_2 - Br \)  
The IUPAC name is ...............  
(a) 1-bromo – 2, 4 – dichlorobutane  
(b) 4-bromo – 1,3 – dichlorobutane  
(c) 2, 4 – dichloro – 1- bromobutane  
(d) 1- bromo n – butyl chloride

11. The structure of 2-bromo, 3-chloro, 2, 4 – dimethyl pentane is ............
(a) \( CH_2Br - CHCl - CH_2 - CH_2Cl \)  
(b) \( CH_3 - CCl_2 - CHBr - CH_3 \)

(c) \( CH_3 - C - CH - CH - CH_3 \)  
(d) \( Br - CH_2 - CH_2 - CH - CH_2 - Cl \)

12. The Lucas reagent is ..............
(a) ZnCl_2  
(b) conc. HCl + ZnCl_2  
(c) anhydrous AlCl_3  
(d) FeCl_3

13. Which alcohol immediately gives alkyl chloride when treated with Lucas reagent?
(a) 2 – Propanol  
(b) 1- butanol  
(c) Ethanol  
(d) 2-methyl-2-propanol

14. The order of stability of carbonium ion is ............
(a) primary carbonium ion > secondary carbonium ion > tertiary carbonium ion  
(b) tertiary carbonium ion > secondary carbonium ion > primary carbonium ion  
(c) secondary carbonium ion > primary carbonium ion > tertiary carbonium ion  
(d) tertiary carbonium ion > primary carbonium ion > secondary carbonium ion

15. Which mechanism is followed by the halogenations of hydrocarbons?
(a) Carbonium ion formation  
(b) Carbanion formation  
(c) Free radical mechanism  
(d) E_2 mechanism

16. Which one of the following is treated with alkyl halide in Swarts reaction?
(a) AgF  
(b) SbF_3  
(c) Both  
(d) Either (a) or (b)

17. Which product is formed when acetone reacts with PCl_5?
(a) Isopropylidene chloride  
(b) 2 chloropropane  
(c) n-propyl chloride(d) tert. butyl chloride

18. Which one of the following compound is used as fire extinguisher and as a solvent?
(a) CHCl_3  
(b) CH_3Cl  
(c) CH_{2}Cl_{2}  
(d) CCl_4

19. Identify the best solvent for fats and oils ............
(a) CH_3Cl  
(b) CH_2Cl_2  
(c) Tetrachloroethylene  
(d) CHCl_3

20. The hydrolysis of primary alkyl halide by aqueous NaOH is an example of ............
(a) S_N^1 mechanism  
(b) S_N^2 mechanism  
(c) E_1 mechanism  
(d) E_2 mechanism

21. Which one of the following is an example for S_N^1 mechanism?
(a) Primary alkyl halid + aqueous NaOH  
(b) Primary alkyl halid + alcoholic KOH  
(c) Tertiary alkyl halide + aqueous NaOH  
(d) Tertiary alkyl halide +alcoholic KOH

22. The shape of carbocation is planar due to the presence of carbon which is in ...... state
(a) sp hybridized  
(b) dsp^3 hybridised  
(c) sp^3 hybridised  
(d) sp^2 hybridised

23. Secondary alkyl halide undergoes hydrolysis by ..............
(a) S_N^1 mechanism  
(b) S_N^2 mechanism

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24. Tertiary alkyl halides undergo hydrolysis by .................
   (a) $S_N^1$ mechanism  (b) $S_N^2$ mechanism
   (c) Both $S_N^1$ and $S_N^2$ mechanism  (d) None of these

25. The reaction between primary alkyl halide and alcoholic KOH take place by which mechanism?
   (a) $S_N^1$  (b) $S_N^2$  (c) Both $S_N^1$ and $S_N^2$  (d) None of these

26. Which one of the following is formed as product when tert, butyl bromide treated with alcoholic KOH?
   (a) 2-methyl propene  (b) Propylene  (c) 1-butene  (d) 2-butene

27. The organic halogen compound that used as an antiseptic is ............
   (a) CHCl$_3$  (b) CHI$_3$  (c) CCl$_4$  (d) CH$_3$I

28. Which organic halogen compound is used as a refrigerant?
   (a) CHCI$_3$  (b) CHI$_3$  (c) CF$_2$Cl$_2$  (d) CCl$_4$

29. CCl$_4$ is used as ................
   (a) an anaesthetic  (b) an antiseptic  (c) a fire extinguisher  (d) a refrigerant

30. Which one of the following is an example of aryl halide?
   (a) Chlorobenzene  (b) Chloromethane  (c) Benzyl chloride  (d) Phenyl magnesium chloride

31. Benzyl chloride is an example of ............
   (a) aryl chloride  (b) aralkyl chloride  (c) primary alkyl chloride  (d) secondary alkyl chloride

32. Which is used as a catalyst in the conversion of benzene to chlorobenzene?
   (a) FeCl$_3$  (b) Fe  (c) AlCl$_3$  (d) ZnCl$_2$

33. The formation of biphenyl from chlorobenzene is named as ............... reaction
   (a) Wurtz  (b) Wurtz-Fitting  (c) Fitting  (d) Friedel – Crafts

34. Phenyl magnesium chloride is prepared in the medium of ............
   (a) ether  (b) water  (c) tetrahydrofuran  (d) alcohol

35. Which one of the following is formed when chloral is treated with chlorobenzene?
   (a) BHC  (b) DDT  (c) Dichlorobenzene  (d) Benzene

36. Which reagent is used to convert benzyl chloride to toluene?
   (a) C$_2$H$_5$OH  (b) H$_2$O  (c) Zn-Cu  (d) Ni-Al/NaOH

37. Which compound reacts with methyl magnesium iodide followed by hydrolysis to yield tertiary alcohol?
   (a) Formaldehyde  (b) Acetone  (c) Acetaldehyde  (d) Ethyl formate

38. Formaldehyde reacts with methyl magnesium iodide followed by hydrolysis yield ....
   (a) 2-propanol  (b) ethanol  (c) 2-methyl 2-propanol  (d) acetic acid

39. Name the product formed when methyl magnesium iodide is treated with water .......
   (a) Ethanol  (b) 2-propanol  (c) Acetic acid  (d) Methane

40. With which reagent methyl magnesium iodide reacts to give ethanoic acid?
   (a) Ethyl formate  (b) Solid CO$_2$  (c) Cyanogen chloride  (d) H$_2$O

41. When ethyl iodide reacts with alcoholic KOH, the product formed is ........
   (a) ethane  (b) ethanol  (c) ethane  (d) ether

42. 2-chlorobutane is a ............
43. The produce formed when methyl magnesium iodide reacts with acetaldehyde followed by hydrolysis is .........
   (a) 1 – propanol (b) 2-propanol (c) 2-methyl-2-propanol (d) ethanol
44. Which reagent reacts with chlorobenzene to produce DDT?
   (a) Chloroform (b) Chloral (c) Chloretone (d) Trichloroacetone
45. Which one of the following is an example of sec. alkyl halide?
   (a) Isobutyl chloride (b) Isopropyl chloride (c) Ethyl chloride (d) n-butyl chloride
46. The structural formula of 1-bromo-2, 2 – dimethyl propane is ............
       CH₃
   (a) CH₃ – CH – CH – Br  (b) CH₃ – C – CH₂Br  (c) CH₃ – C – Br  (d) CH₃ – C – CH₂Br
      |     |             |   |   |       |
    CH₃  CH₃  H             CH₃  CH₃
   (c) CH₃ – C – Br  (d) CH₃ – C – CH₂Br
      |     |             |   |   |       |
   CH₃  |   |            |
   47. Which one of the alkyl halide is more reactive?
   (a) Primary alkyl halide (b) Tertiary alkyl halide (c) Isobutyl chloride (d) Sec. alkyl halide
48. Alkyl halides are insoluble in water due to ............
   (a) formation of hydrogen bond (b) inability to form hydrogen bond (c) small molecular size (d) the absence of oxygen atom
49. Which reagent is used to convert chlorobenzene to benzene?
   (a) NH₂NH₂ (b) Ni-Al/NaOH (c) NH₂OH (d) HNO₃
50. BHC is ............
   (a) an explosive (b) a artificial fibre (c) a drug (d) an insecticide
1. Chemical Calculation

1. A mole of a substance contains .....................
   (a) 1 molecule  (b) 6.023 x 10^{-23} molecules
   (c) 1 atom     (d) 6.023 x 10^{23} molecule
   Ans: (b) 6.023 x 10^{23} molecules

2. Molar mass of carbon is exactly equal to ............... 
   (a) 1 g mol^{-1}  (b) 12 g mol^{-1}  (c) 6 g mol^{-1}  (d) 32 g mol^{-1}
   Ans: (b) 12 g mol^{-1}

3. According to electronic concept, oxidation reaction is the one in which ............
   (a) loss of electron take place  (b) gain of electron take place
   (c) addition of hydrogen take place  (d) addition of electropositive element take place
   Ans: (a) loss of electron take place

4. The reaction in which gain of electrons take place is known as .............
   (a) oxidation  (b) reduction  (c) hydrolysis  (d) addition reaction
   Ans: (b) reduction

5. The oxidation number of an element in the free state is always ................
   (a) positive  (b) negative  (c) zero  (d) whole number
   Ans: (c) zero

6. The oxidation number of phosphorus in PO_{4}^{3-} is equal to .................
   (a) +3  (b) -3  (c) +5  (d) -5
   Ans: (c) +5

7. The molecular mass of volatile compound is determined by ................ method.
   (a) hydrogen displacement  (b) Victor Meyer
   (c) oxide  (d) Chloride
   Ans: (b) Victor Meyer

2. General Introduction to Metallurgy

1. Which one of the following metal occur in native form?
   (a) Tin  (b) Zinc  (c) Platinum  (d) Calcium
   Ans: (c) Platinum

2. The mixture of ore with earthy impurities is known as ................
   (a) flux  (b) slag  (c) gangue  (d) mineral
   Ans: (c) gangue

3. Which one of the following metal can occur in free state as well as in combined state?
   (a) Tin  (b) Zinc  (c) Gold  (d) Silver
   Ans: (d) Silver

4. Identify the ore of the metal aluminium ....................
   (a) Bauxite  (b) Clay  (c) Aluminate  (d) Al_{2}(SO_{4})_{3}
   Ans: (a) Bauxite

5. Which one of the following is the formula of clay?
   (a) Al_{2}O_{3} . 2H_{2}O  (b) Al_{2}O_{3} . 2SiO_{2} . 2H_{2}O
   (c) Al_{2}(SO_{4})_{3}  (d) Al_{2}SO_{4} . K_{2}SO_{4} . 24H_{2}O
   Ans: (b) Al_{2}O_{3} . 2SiO_{2} . 2H_{2}O

6. Which one of the following is the ore of mercury?
Dedication! Determination!! Distinction!!!

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(a) Galena (b) Pitch blende (c) P7yrolusite (d) Cinnabar

Ans: (d) Cinnabar

7. Galena is an ore of which metal?
(a) Lead (b) Meucury (c) Silver (d) Tin

Ans: (a) Lead

8. Which one of the following is the formula of Rock salt?
(a) NaHCO₃ (b) Na₂CO₃ (c) NaCl (d) Na₂SiO₃

Ans: (c) NaCl

9. Which process is applied to concentrate oxide ore?
(a) Hand picking (b) Hydraulic washing (c) Chemical method (d) Froth floatation process

Ans: (b) Hydraulic washing

10. Which one of the following ore is concentrated by Froth floatation process?
(a) Sulphate ore (b) Phosphate ore (c) Oxide ore (d) Sulphide ore

Ans: (d) Sulphide ore

11. Which one of the following is used as foaming agent?
(a) Water (b) Air (c) Pine oil (d) Kerosene

Ans: (c) Pine oil

12. Identify the method to concentrate Tinstone ……………
(a) Chemical method (b) Hand picking process (c) Forth floatation process (d) Electromagnetic separation process

Ans: (c) Forth floatation process

13. Chemical method is applied to concentrate …………………. ore.
(a) Zinc blende (b) Bauxite (c) Tinstone (d) Phosphorite

Ans: (b) Bauxite

14. The reducting agent used in reduction roasting is …………………
(a) water (b) active hydrogen (c) carbon (d) Either (b) or (c)

Ans: (d) Either (b) or (c)

15. Heating the ore in the absence of air is called ……………
(a) roasting (b) smelting (c) calcinations (d) reduction

Ans: (c) calcinations

16. What is the function of limestone in smelting process?
(a) Catalyst (b) Oxidising agent (c) Reduction agent (d) Flux

Ans: (d) Flux

17. The lining in basic Bessemer process is …………………
(a) silica (b) lime (c) SiO₂ (d) Both (a) or (b)

Ans: (b) lime

18. Which one of the following is used as an electrolyte in electrolytic refining of silver from argentiferous lead?
(a) Silver sulphate (b) Silver chloride (c) H₂SiF₆ + PbSiF₆ (d) SiF₄ + H₄SiO₄

Ans: (c) H₂SiF₆ + PbSiF₆

19. Which one of the following is the purification of process of lead?
(a) Mond’s process (b) Bett’s process (c) Bessemer process (d) Cyanide process

Ans: (b) Bett’s process
20. Which one of the following is called Felspar?
(a) Na₃AlF₆  (b) Na₂SiO₃  (c) K₂OAl₂O₃ 6SiO₂  (d) NaF

Ans: (c) K₂OAl₂O₃ 6SiO₂

3. Atomic Structure-I
1. The introduction of atomic theory was given by ..............
(a) Neil’s Bohr  (b) Rutherford  (c) John Dalton  (d) Thomson

Ans: (c) John Dalton

2. The total number of nucleons is termed as .................
(a) Atomic number  (b) Mass number  (c) Nuclear charge  (d) Quantum number

Ans: (b) Mass number

3. The two dimensional circular path taken by electrons is known as ............... 
(a) orbit  (b) orbital  (c) sub shell  (d) nucleus

Ans: (a) orbit

4. An orbital is a three dimensional boundary of space where there is maximum probability of finding ..............
(a) protons  (b) electrons  (c) nucleons  (d) neutrons

Ans: (b) electrons

5. The number of protons is known as .............
(a) Mass number  (b) Atomic mass  (c) Atomic number  (d) Nuclear number

Ans: (c) Atomic number

6. When the principal quantum number n value is 3 means, the electron present in which energy level?
(a) K  (b) L  (c) M  (d) N

Ans: (c) M

7. The splitting of spectral lines by magnetic field into multiple lines is known as ...........
(a) Photo electric effect  (b) Stark effect  (c) Zeeman effect  (d) Spectro effect

Ans: (b) Stark effect

8. It is impossible to determine simultaneously with the certainty the position and momentum of a particle. This is known as ............
(a) Pauli exclusion principle  (b) Hund’s rule  (c) Aufbau principle  (d) Heisenberg’s uncertainty principle

Ans: (d) Heisenberg’s uncertainty principle

9. What is the principal quantum number value if the electron is present in N energy level?
(a) 3  (b) 4  (c) 2  (d) 1

Ans: (b) 4

10. Which quantum number indicates the shape of the orbital?
(a) Principle quantum number  (b) Spin quantum number  (c) Azimuthal quantum number  (d) Magnetic quantum number

Ans: (c) Azimuthal quantum number

11. The energy level in which the electrons are located is given by which quantum number?

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12. Which quantum number determines the orientation of the orbital in space?
(a) Magnetic quantum number  
(b) Principal quantum number  
(c) Azimuthal quantum number  
(d) Spin quantum number

**Ans: (a) Magnetic quantum number**

13. How many sub levels are possible for the principal quantum number 4?
(a) 1  
(b) 2  
(c) 3  
(d) 4

**Ans: (d) 4**

14. How many sub levels can be present in main level 2?
(a) 2  
(b) 3  
(c) 1  
(d) 4

**Ans: (a) 2**

15. The maximum number of electrons that can be accommodated in the energy level is given by the formula …………………
(a) $n + 1$  
(b) $2n + 2$  
(c) $2n^2$  
(d) $2(n+2)^2$

**Ans: (c) $2n^2$**

16. The number of electrons that can be accommodated in the sub level is deduced by the formula ………………….
(a) $2n^2$  
(b) $2(2l + 1)$  
(c) $(l + 1)$  
(d) $2n + 1$

**Ans: (b) $2(2l + 1)$**

17. What is the total number of orbitals associated with the principal quantum number n = 3 ?
(a) 3  
(b) 6  
(c) 4  
(d) 9

**Ans: (d) 9**

18. Which orbital has spherical node?
(a) s  
(b) p  
(c) d  
(d) f

**Ans: (a) s**

### 4. Periodic Classification - I

1. The law of triads was given by …………………
(a) Newland  
(b) Dobereiner  
(c) Mendeleev  
(d) Lother Meyer

**Ans: (b) Dobereiner**

2. Which one of the following does not obey the law of triads?
(a) Li, Na, K  
(b) O, H, N  
(c) Ca, Sr, Ba  
(d) Cl, Br, I

**Ans: (b) O, H, N**

3. Mendeleev’s periodic classification was based on the …………………. of elements.
(a) atomic number  
(b) mass number  
(c) number of neutrons  
(d) number of electrons

**Ans: (b) mass number**

4. Modern periodic law states the properties of the elements are periodic function of their …………………
(a) atomic mass  
(b) mass number  
(c) atomic number  
(d) number of nucleons

**Ans: (c) atomic number**

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5. The element with atomic number 110 has the symbol according to IUPAC nomenclature is ……………
   (a) Uun   (b) Une   (c) Unh   (d) Unq
   Ans: (a) Uun

6. The IUPAC name formula Uus indicates that element has atomic number as …………..
   (a) 106   (b) 101   (c) 107   (d) 117
   Ans: (d) 117

7. Group numbers 13 to 18 are named as …………………
   (a) d-block elements   (b) transition elements
   (c) p-block elements   (d) inner transition elements
   Ans: (c) p-block elements

8. Alkali metals belong to …………………
   (a) group 3   (b) group 2   (c) group 18   (d) group 1
   Ans: (d) group 1

9. The elements with electronic configuration ns² np⁶ are named as …………………
   (a) representative elements   (b) noble gases
   (c) alkali metals   (d) alkaline earth metals
   Ans: (b) noble gases

10. The group 17 elements are belongs to …………………
    (a) noble gas family   (b) alkaline earth metals
    (c) halogen family   (d) radioactive elements
    Ans: (c) halogen family

11. The amount of energy required to remove an electron from a neutral gaseous atom is known as …………………
    (a) Electron affinity   (b) Electron gain enthalpy
    (c) Ionisation potential   (d) Electronegativity
    Ans: (c) Ionisation potential

12. The unit of electron affinity is …………………
    (a) kJ mol⁻¹   (b) cals   (c) kg m⁻³   (d) joule
    Ans: (a) kJ mol⁻¹

13. Which one of the following does not affect Ionisation energy?
    (a) Atomic size   (b) Nuclear charge   (c) Screening effect   (d) Photoelectric effect
    Ans: (d) Photoelectric effect

14. Which one of the following is not a periodic property?
    (a) Atomic radii   (b) Electronegativity   (c) Electron affinity   (d) Lattice energy
    Ans: (d) Lattice energy

15. Which one of the following is a relative property?
    (a) Atomic radii   (b) Electronegativity   (c) Ionisation potential   (d) Electron affinity
    Ans: (b) Electronegativity

16. Electron affinity of noble gases are …………………
    (a) zero   (b) maximum   (c) minimum   (d) positive
    Ans: (a) zero

17. As we move down the group, electronegativity value …………………
**5. Group 1s-Block Elements**

1. Identify the element which does not have neutron?
   - (a) Hydrogen
   - (b) Heavy hydrogen
   - (c) Tritium
   - (d) Lithium
   **Ans: (a) Hydrogen**

2. The number of neutrons present in the nucleus of deuterium is .............
   - (a) 3
   - (b) 2
   - (c) 1
   - (d) 0
   **Ans: (c) 1**

3. The percentage abundance of protium in native is ..................
   - (a) 0.016
   - (b) 99.984
   - (c) $10^{-15}$
   - (d) 1
   **Ans: (b) 99.984**

4. The number of neutrons and protons present in Tritium are ...............
   - (a) 2, 1
   - (b) 1, 2
   - (c) 1, 3
   - (d) 3, 1
   **Ans: (a) 2, 1**

5. The approximate ratio of D: H in naturally occurring hydrogen is ........
   - (a) 1 : 2
   - (b) 1 : 1.5
   - (c) 1 : 6000
   - (d) 1 : $10^{-15}$
   **Ans: (c) 1 : 6000**

6. Which one of the following is not used to electrolyse heavy water to get Deuterium?
   - (a) Sodium
   - (b) Red hot iron
   - (c) Tungsten
   - (d) Phosphorus
   **Ans: (d) Phosphorus**

7. Which compounds are formed when sodium deuteride reacts with water?
   - (a) NaOD + H₂
   - (b) NaOH + D₂
   - (c) NaOH + HD
   - (d) Na + D₂O
   **Ans: (c) NaOH + HD**

8. Which metal is used in the reaction between deuterium and ethylene?
   - (a) Na
   - (b) Ni
   - (c) H₂
   - (d) Sn + HCl
   **Ans: (b) Ni**

9. Which isotope of hydrogen is used in nuclear fusion reaction?
   - (a) Protium
   - (b) Deuterium
   - (c) Tritium
   - (d) Heavy hydrogen
   **Ans: (c) Tritium**

10. Which is the rare isotope of hydrogen?
    - (a) Protium
    - (b) Tritium
    - (c) Deuterium
    - (d) Heavy hydrogen
    **Ans: (b) Tritium**

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11. Tritium is prepared by bombarding beryllium with ……….
   (a) slow neutrons    (b) protons    (c) α-particle    (d) deuterons
   **Ans:** (d) deuterons

12. Which one of the following is used as a radioactive tracer in chemical research?
   (a) Protium    (b) Deuterium    (c) Tritium    (d) Heavy water
   **Ans:** (c) Tritium

13. What is the percentage of ortho and para hydrogen at 25 K?
   (a) 99% and 1%    (b) 1% and 99%    (c) 75% and 25%    (d) 25% and 75%
   **Ans:** (b) 1% and 99%

14. Which one of the following is used to absorb para hydrogen from ordinary hydrogen?
   (a) Animal charcoal    (b) Anthracite coal    (c) Activated charcoal    (d) Coke
   **Ans:** (c) Activated charcoal

15. Which one of the following method is not used to covert para hydrogen into ortho hydrogen?
   (a) By passing an electric discharge    (b) By heating to 800°C
   (c) By mixing with atomic hydrogen    (d) By heating with Cl₂
   **Ans:** (d) By heating with Cl₂

16. Which one of the following is used to bleach silk, wool and hair?
   (a) H₂O    (b) H₂O₂    (c) H₂    (d) D₂
   **Ans:** (b) H₂O₂

17. Which colour is produced when sodium burnt in Bunsen flame?
   (a) Crimson red    (b) Lilac    (c) Yellow    (d) Blue
   **Ans:** (c) Yellow

18. Which one of the following alkali metal is radioactive?
   (a) Lithium    (b) Sodium    (c) Patassium    (d) Francium
   **Ans:** (d) Francium

19. Sodium on burning in air forms …………
   (a) Na₂O    (b) Na₂O₂    (c) NaO₂    (d) (a) and (b)
   **Ans:** (d) (a) and (b)

20. In the preparation of copper and Nickel, Lithium is used as ……………
   (a) Catalyst    (b) deoxidiser    (c) oxidiser    (d) promoter
   **Ans:** (b) deoxidiser

21. Which compounds are used in the treatment of gout?
   (a) LiAlH₄    (b) Li₂O
   (c) Lithium citrate and salicylate    (d) Lithium hydroxide
   **Ans:** (c) Lithium citrate and salicylate

22. Which compound of Lithium is used as a reducing agent?
   (a) LiAlH₄    (b) Li₂O    (c) LiCl    (d) Li₂O₂
   **Ans:** (a) LiAlH₄

23. Sodium amalgam is used as ……………
   (a) oxidising agent    (b) reducing agent
   (c) dehydrating agent    (d) decarboxylating agent
   **Ans:** (b) reducing agent

24. Which metal is used to reduced CO₂ to C?

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**Dedication!**

**Determination!!**

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25. Sodium forms ………………… crystals.
(a) Octahedral  (b) Pyramidal  (c) Tetragonal  (d) Rhombic
**Ans:** (c) Tetragonal

6. **Group 2-s-Block Elements**

1. Which one of the following does not belong to group 2 elements?
   (a) Sodium  (b) Calcium  (c) Barium  (d) Beryllium
   **Ans:** (a) Sodium

2. Which one of the alkaline earth metal is radioactive?
   (a) Beryllium  (b) Radium  (c) Strontium  (d) Calcium
   **Ans:** (b) Radium

3. What is the general outer electronic configuration of alkaline earth metals?
   (a) ns² np⁶  (b) ns¹  (c) ns²  (d) ns² np¹⁻⁵
   **Ans:** (c) ns²

4. Which one of the following has the highest ionisation energy?
   (a) Ba  (b) Mg  (c) Ca  (d) Be
   **Ans:** (d) Be

5. The divalent ion of group 2 elements are …………………
   (a) Ferromagnetic  (b) Diamagnetic  (c) Paramagnetic  (d) None of these
   **Ans:** (b) Diamagnetic

6. The colour of the flame produced by strontium is …………………
   (a) apple green  (b) brick red  (c) blue  (d) crimson red
   **Ans:** (d) crimson red

7. Which one of the following is called Epsom salt?
   (a) CuSO₄ . 5H₂O  (b) FeSO₄ . 7H₂O  (c) MgSO₄ . 7H₂O  (d) ZnSO₄ . 7H₂O
   **Ans:** (c) MgSO₄ . 7H₂O

8. Identify the third most abundant dissolved ion in the ocean …………………
   (a) Mg²⁺  (b) Be²⁺  (c) Ca²⁺  (d) Ra²⁺
   **Ans:** (a) Mg²⁺

9. Which one of the following is used in flash light photography and in fire-works?
   (a) Ca  (b) Mg  (c) Ba  (d) Ra
   **Ans:** (b) Mg

10. Which one of the following is used as a purgative?
     (a) Calcium oxide  (b) Beryllium chloride
        (c) Magnesium sulphate  (d) Copper sulphate
     **Ans:** (c) Magnesium sulphate

11. Which compound is used as a drying agent for gases and alcohol?
    (a) Calcium oxide  (b) Magnesium sulphate  (c) Plaster of paris  (d) Gypsum
    **Ans:** (a) Calcium oxide

12. ………………… is used in refining sugar and white washing.
    (a) CaO  (b) CaCO₃  (c) CaCl₂  (d) CaSO₄ . 2H₂O
    **Ans:** (a) CaO

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13. Which compound is used as a retardant for the setting of cement?
   (a) Quick lime  
   (b) Gypsum  
   (c) Plater of Paris  
   (d) Epsom salt

   **Ans:** (b) Gypsum

14. The process of setting of plaster of paris is catalysed by ...............  
   (a) CaCl₂  
   (b) Na₂CO₃  
   (c) NaCl  
   (d) CaCO₃

   **Ans:** (b) Plater of paris

7. **p-Block Elements**

1. The general electronic configuration of group 17 is .................  
   (a) ns² np¹  
   (b) ns² np⁵  
   (c) ns² np⁶  
   (d) ns² np²

   **Ans:** (b) ns² np⁵

2. ns² np¹-⁶ is the general outer electronic configuration of ........... elements.  
   (a) s-block  
   (b) d-block  
   (c) f-block  
   (d) p-block

   **Ans:** (d) p-block

3. The electronic configuration of boron group is .................  
   (a) ns²  
   (b) ns² np²  
   (c) ns² np¹  
   (d) ns² np⁶

   **Ans:** (c) ns² np¹

4. The most stable oxidation state of thallium is ...............  
   (a) +1  
   (b) + 2  
   (c) +3  
   (d) +4

   **Ans:** (a) +1

5. The oxides of metallic elements of p-block is .................  
   (a) acidic  
   (b) basic  
   (c) amphoteric  
   (d) neutral

   **Ans:** (b) basic

6. Which one of the following oxide is amphoteric oxide?  
   (a) Bi₂O₃  
   (b) SO₃  
   (c) GeO₂  
   (d) Cl₂O₇

   **Ans:** (c) GeO₂

7. Which one of the following oxide is the most acidic oxide?  
   (a) Al₂O₃  
   (b) SiO₂  
   (c) P₄O₁₀  
   (d) Cl₂O₇

   **Ans:** (d) Cl₂O₇

8. Which is the correct order of stability of hydrides?  
   (a) PH₃ > AsH₃ > NH₃ > SbH₃ > BiH₃  
   (b) NH₃ < PH₃ < AsH₃ < SbH₃ < BiH₃  
   (c) NH₃ > PH₃ > AsH₃ > SbH₃ > BiH₃  
   (d) BiH₃ > SbH₃ > ASH₃ > PH₃ > NH₃

   **Ans:** (c) NH₃ > PH₃ > AsH₃ > SbH₃ > BiH₃

9. In group 16, which element form the most basic oxide?  
   (a) Carbon  
   (b) Silicon  
   (c) Germanium  
   (d) Lead

   **Ans:** (d) Lead

10. The formula of Razorite is .....................  
    (a) Na₂B₃O₇  
    (b) Na₂B₄O₇ • 4H₂O  
    (c) Na₂B₄O₇ • 10H₂O  
    (d) Ca₂B₆O₁₁ • 5H₂O

    **Ans:** (b) Na₂B₄O₇ • 4H₂O

11. 2Mg₃B₈O₁₅ • MgCl₂ is named as ..................  
    (a) Razorite  
    (b) Borax  
    (c) Boracite  
    (d) Colemanite

    **Ans:** (c) Boracite
12. Which one of the product is formed when amorphous boron dissolves in concentrated sulphuric acid?
(a) Boron trioxide  (b) Boron sulphate  (c) Boron sulphide  (d) Boric acid
Ans: (d) Boric acid

13. Boron is a powerful …………..
(a) conductor of electricity  (b) reducing agent  (c) oxidising agent  (d) hydrying agent
Ans: (b) reducing agent

14. Which one of the following compound is used as a flux in welding metals?
(a) Boron trioxide  (b) Borax  (c) Boric acid  (d) Boron trifluoride
Ans: (b) Borax

15. Borax bead test is used to identify ……………………
(a) acid radical  (b) metallic radical  (c) complex salt  (d) double salt
Ans: (b) metallic radical

16. The colour produced by chromium in oxidising flame of borax bead test is …………..
(a) blue  (b) red  (c) green  (d) grey
Ans: (c) green

17. The compound formed when B$_2$O$_3$ reacts with water is …………..
(a) Boric acid  (b) Boron  (c) Boron hydroxide  (d) Boron hydride
Ans: (a) Boric acid

18. In diborane, the hybridised state of boron is …………..
(a) sp$^1$  (b) sp$^2$  (c) sp$^3$  (d) sp$^3$d
Ans: (b) sp$^2$

19. Which one of the following does not belong to 14th group of the periodic table?
(a) Carbon  (b) Boron  (c) Silicon  (d) Germanium
Ans: (b) Boron

20. Which one of the following is not an allotropic form of carbon?
(a) Diamond  (b) Graphite  (c) Coal  (d) Alabaster
Ans: (d) Alabaster

21. Which one of the following is belong to amorphous varieties of carbon?
(a) Coke  (b) Graphite  (c) Diamond  (d) None of these
Ans: (a) Coke

22. The bonds present in diamond are strongly ………….. bonds.
(a) ionic  (b) electrovalent  (c) covalent  (d) dative
Ans: (c) covalent

23. Which one of the following is a metalloid?
(a) Carbon  (b) Germanium  (c) Silicon  (d) Lead
Ans: (b) Germanium

24. B$_4$C is an example of ………….. hydride.
(a) ionic  (b) metallic  (c) interstitial  (d) covalent
Ans: (d) covalent

25. Which one of the compound is used in the manufacture of viscose rayon and cellophane?
(a) CO₂  (b) Cs₂  (c) CO  (d) SiC  
Ans: (b) Cs₂

26. Which compound is named as salt petre?  
(a) NaNO₃  (b) KCl  (c) KNO₃  (d) NH₄NO₃  
Ans: (c) KNO₃

27. Which compound is used as a refrigerant in ice-plants?  
(a) Ammonia  (b) Nitric oxide  (c) Nitrous acid  (d) Nitrous oxide  
Ans: (a) Ammonia

28. The oxy acid used in the purification of gold and silver is .................  
(a) HNO₂  (b) HNO₃  (c) H₂SO₄  (d) H₂SO₃  
Ans: (b) HNO₃

29. Which compound is used in pickling of stainless steel?  
(a) Nitrous acid  (b) Nitrous oxide  (c) Nitric acid  (d) Nitrogen pentoxide  
Ans: (c) Nitric acid

30. Which is used for bleaching oils, ivory, flour and starch?  
(a) O₂  (b) O₃  (c) CO₂  (d) CO  
Ans: (d) CO

8. The Solid State-I

1. The solid in which the atoms are held together by strong cohesive forces is known as .............  
(a) isotropic solid  (b) crystalline solid  (c) pseudosolid  (d) supercooled liquid  
Ans: (b) crystalline solid

2. Which one of the following is not a crystalline solid?  
(a) Glass  (b) Sugar  (c) Sodium chloride  (d) Sulphur  
Ans: (a) Glass

3. Which one of the following is an anisotropic solid?  
(a) Glass  (b) Plastic  (c) Sodium chloride  (d) Rubber  
Ans: (c) Sodium chloride

4. Amorphous solid is otherwise known as .................  
(a) pseudo solid  (b) crystalline solid  (c) true solid  (d) anisotropic solid  
Ans: (a) pseudo solid

5. Which one of the following is an isotropic solid?  
(a) Sodium chloride  (b) Sugar  (c) Caesium chloride  (d) Plastic  
Ans: (d) Plastic

6. If the physical properties are different in different directions, the phenomenon is known as ...............  
(a) anisotropy  (b) isotropy  (c) crystallography  (d) None of these  
Ans: (a) anisotropy

7. If the thermal properties and electrical properties of solid are same in all directions, the phenomenon is referred as ...............  
(a) anisotropy  (b) isotropy  (c) crystallography  (d) None of these  
Ans: (b) isotropy

8. Which one of the crystal has all faces alike?  
(a) Galena  (b) Plastic  (c) Glass  (d) Fluorospar
9. In Galena, all faces are .......... 
(a) not alike (b) alike (c) same (d) equivalent

Ans: (a) not alike

10. The primitives of a unit cell are known as .......... 
(a) characteristic intercepts (b) faces (c) axes (d) interfaces

Ans: (a) characteristic intercepts

11. Which one of the following is not the type of unit cell? 
(a) Cubic (b) Square planar (c) Monoclinic (d) Hexagonal

Ans: (c) Monoclinic

12. In a simple cubic unit cell, the angle between each of axes is .......... 
(a) 120° (b) 60° (c) 90° (d) 180°

Ans: (c) 90°

13. The number of atoms in a body centred cubic cell is .......... 
(a) 1 (b) 3 (c) 4 (d) 2

Ans: (d) 2

14. The number of atoms per unit cell in simple cubic structure is .......... 
(a) 2 (b) 4 (c) 1 (d) 3

Ans: (c) 1

15. At which temperature, CsCl structure changes to NaCl structure? 
(a) 100 K (b) 273 K (c) 373 K (d) 760 K

Ans: (d) 760 K

16. Caesium chloride structure has .......... 
(a) body centred cubic system (b) face centred cubic system (c) simple cubic system (d) None of these

Ans: (a) body centred cubic system

17. The lattice points can be broken up into a number of .......... 
(a) molecules (b) atoms (c) ions (d) unit cells

Ans: (d) unit cells
5. When the number of moles of gas increases ……………
   (a) pressure increases  (b) temperature increases
   (c) temperature decreases  (d) pressure decrease
   **Ans:** (a) pressure increases

6. Which one of the equation represent Boyle’s law?
   (a) \( P \propto T \)  (b) \( V \propto T \)  (c) \( \frac{P}{T} = \text{constant} \)  (d) \( PV = \text{constant} \)
   **Ans:** (d) \( PV = \text{constant} \)

7. Which one of the equation represent Charle’s law?
   (a) \( \frac{P_1V_1}{P_2V_2} = \text{constant} \)  (b) \( PV = \text{constant} \)  (c) \( \frac{P}{V} = \text{constant} \)  (d) \( \frac{T}{P} = \text{constant} \)
   **Ans:** (d) \( \frac{T}{P} = \text{constant} \)

8. The value of normal atmospheric pressure ……………
   (a) 10 atm. pressure  (b) \( 1.013 \times 10^{-5} \text{Nm}^{-2} \)  (c) \( 1.013 \times 10^5 \text{Nm}^{-2} \)  (d) \( 1.013 \times 10^{-3} \text{Nm}^{-2} \)
   **Ans:** (c) \( 1.013 \times 10^5 \text{Nm}^{-2} \)

9. Which one of the following is the value of \( R \) in C.G.S. system?
   (a) \( 0.0821 \text{dm}^3 \text{atm. K}^{-1} \text{mol}^{-1} \)  (b) \( 8.314 \times 10^7 \text{erg. K}^{-1} \text{mol}^{-1} \)
   (c) \( 8.314 \text{joule K}^{-1} \text{mol}^{-1} \)  (d) \( 1.987 \text{cals K}^{-1} \text{mol}^{-1} \)
   **Ans:** (b) \( 8.314 \times 10^7 \text{erg. K}^{-1} \text{mol}^{-1} \)

10. The value of \( R \) gas contant in M.K.S. system is ……………
    (a) \( 0.0821 \text{dm}^3 \text{atm. K}^{-1} \text{mol}^{-1} \)  (b) \( 8.314 \text{litre atm. K}^{-1} \text{mol}^{-1} \)
    (c) \( 1.987 \text{cals K}^{-1} \text{mol}^{-1} \)  (d) \( 8.314 \times 10^7 \text{erg. K}^{-1} \text{mol}^{-1} \)
    **Ans:** (c) \( 1.987 \text{cals K}^{-1} \text{mol}^{-1} \)

11. Partial pressure is calculated by the formula ……………
    (a) \( \text{fraction} \frac{Mole}{pressure} \text{Total} \)  (b) Total pressure x Mole fraction
    (c) Pressure x Number of moles  (d) Total pressure x Molecular mass
    **Ans:** (b) Total pressure x Mole fraction

12. The value of excluded volume is equal to ……………
    (a) \( V \times n \)  (b) \( V \times 2n \)  (c) \( 4 \times V_m \)  (d) Volume of 1 molecule
    **Ans:** (c) \( 4 \times V_m \)

13. \( \frac{a}{V^2} \) is called ……………
    (a) internal pressure  (b) excluded volume
    (c) increased volume  (d) None of these
    **Ans:** (a) internal pressure

14. The unit of Vander waal’s constant ‘\( a \)’ is …………..
    (a) \( \text{dm}^3 \text{mol}^{-1} \)  (b) atm. \( \text{dm}^6 \text{mol}^{-2} \)  (c) atm. \( \text{dm}^3 \text{mol}^{-1} \)  (d) \( \text{mol}^{-1} \)
    **Ans:** (b) atm. \( \text{dm}^6 \text{mol}^{-2} \)

15. The unit of excluded volume is …………………
    (a) \( \text{dm}^3 \text{mol}^{-1} \)  (b) atm.\( \text{dm}^6 \text{mol}^{-1} \)  (c) atm.\( \text{dm}^3 \text{mol}^{-1} \)  (d) \( \text{mol}^{-1} \)
    **Ans:** (a) \( \text{dm}^3 \text{mol}^{-1} \)
16. The critical temperature of carbon dioxide is ……..
   (a) 273 K  (b) 304.1 K  (c) 100°C  (d) 100 K
   **Ans:** (b) 304.1 K

17. What happens at inversion temperature?
   (a) Fall in temperature  (b) Rise in temperature
   (c) Cooling take place  (d) Neither fall nor rise in temperature
   **Ans:** (d) Neither fall nor rise in temperature

18. Which principle is involved in Linde’s method?
   (a) Joule Thomson effect  (b) Adiabatic expansion
   (c) Adiabatic demagnetisation  (d) All of these
   **Ans:** (a) Joule Thomson effect

19. What is the low temperature produced by adiabatic demagnetisation?
   (a) $10^{-2}$ K  (b) $10^{-4}$ K  (c) $10^{-1}$ K  (d) $10^{-6}$ K
   **Ans:** (b) $10^{-4}$ K

20. Which substance is used for adiabatic demagnetisation method?
   (a) ceric sulphate  (b) Iron sulphate
   (c) Gadolinium sulphate  (d) Copper sulphate
   **Ans:** (c) Gadolinium sulphate

10. Chemical Bonding

1. Which one of the following is an example for homonuclear diatomic molecule?
   (a) Ozone  (b) Carbon monoxide  (c) Oxygen  (d) Sodium
   **Ans:** (c) Oxygen

2. Which one of the following is an example for heteronuclear diatomic molecule?
   (a) HCl  (b) O$_3$  (c) O$_2$  (d) HCHO
   **Ans:** (a) HCl

3. Phosphorus is an example of ……….. molecule.
   (a) homonuclear diatomic  (b) homonuclear polyatomic
   (c) heteronuclear diatomic  (d) heteronuclear polyatomic
   **Ans:** (b) homonuclear polyatomic

4. Which one of the following compound contains an electrovalent bond?
   (a) CO$_2$  (b) CCl$_4$  (c) NH$_3$  (d) NaCl
   **Ans:** (d) NaCl

5. Identify the nature of the bond present in oxygen molecule …………..
   (a) Electrovalent bond  (b) Metallic bond
   (c) Covalent bond  (d) Dative bond
   **Ans:** (c) Covalent bond

6. Homonuclear diatomic molecules possess ………………….
   (a) ionic bond  (b) covalent bond
   (c) metallic bond  (d) co-ordinate covalent bond
   **And:** (b) covalent bond

7. The lattice enthalpy of NaCl is ………………….
   (a) -788 kJ mol$^{-1}$  (b) +788 kJ mol$^{-1}$  (c) -399 kJ mol$^{-1}$  (d) +399 kJ mol$^{-1}$
   **Ans:** (b) +788 kJ mol$^{-1}$
8. Which is used in the determination of lattice enthalpy?
   (a) Octet rule  (b) Law of mass action  (c) Born-Haber cycle  (d) Lawis theory
   **Ans:** (c) Born-Haber cycle

9. The interatomic bond formed due to the overlap of atomic orbitals of electrons is known as …………
   (a) ionic bond  (b) electrovalent bond  (c) co-ordinate covalent bond  (d) covalent bond
   **Ans:** (d) covalent bond

10. The number and nature of bonds present in ethane molecule are ……………
    (a) 5 sigma bond and 1 pi bond  
    (b) 6 C–H sigma bond and one C–C sigma bond  
    (c) 4 C–H sigma bond and one C=C bond  
    (d) 2 C–H sigma bond and one C=C bond
    **Ans:** (b) 6 C–H sigma bond and one C–C sigma bond

11. Carbon tetrachloride is a ……………
    (a) covalent non polar molecule  (b) ionic polar molecule  (c) electrovalent rigid molecule  (d) co-ordinate covalent molecule
    **Ans:** (a) covalent non polar molecule

12. Which is the general trend in polarising power of cations of I group elements?
    (a) Cs⁺ > Rb⁺ > K⁺ > Na⁺ > Li⁺  
    (b) Li⁺ > Na⁺ > K⁺ > Rb⁺ > Cs⁺  
    (c) Na⁺ < Li⁺ > K⁺ < Cs⁺ < Rb⁺  
    (d) Li⁺ < Na⁺ > K⁺ < Rb⁺ > Cs⁺
    **Ans:** (b) Li⁺ > Na⁺ > K⁺ > Rb⁺ > Cs⁺

13. Which one of the following is not a dipolar molecule?
    (a) H–F  (b) H–Cl  (c) H₂O  (d) NH₃
    **Ans:** (d) NH₃

14. What is the shape of Beryllium chloride molecule?
    (a) Linear  (b) Pyramidal  (c) Square planar  (d) Tetrahedral
    **Ans:** (a) Linear

15. Tetrahedral shape is possessed by which molecule?
    (a) Ammonia  (b) Water  (c) Methane  (d) SO₂
    **Ans:** (c) Methane

16. Which molecule is represented by AB₃E type?
    (a) SO₂  (b) H₂O  (c) NH₃  (d) CH₄
    **Ans:** (c) NH₃

17. H₂O is represent by which molecular type?
    (a) AB₂E  (b) AB₂E₂  (c) AB₃E  (d) AB₂
    **Ans:** (b) AB₂E₂

18. The molecule SF₆ has geometrical arrangement as ……………
    (a) linear  (b) square planar  (c) octahedral  (d) pyramidal
    **Ans:** (c) octahedral

19. The bond angle in water molecule is ……………
    (a) 104.5°  (b) 109°28’  (c) 107°  (d) 90°
    **Ans:** (a) 104.5°

20. The molecular geometry of BF₃ is ……………
11. Colligative Properties

1. Isotonic solutions are the solutions having the same …………..
   (a) surface tension (b) vapor pressure (c) osmotic pressure (d) viscosity
   Ans: (c) osmotic pressure

2. A colligative property is ……………
   (a) osmotic pressure (b) boiling point (c) vapour pressure (d) electrical conductivity
   Ans: (a) osmotic pressure

3. At high altitude, the boiling point of water decreases because, …………..
   (a) the atmospheric pressure is high (b) the temperature is low (c) the atmospheric pressure is low (d) the temperature is high
   Ans: (a) the atmospheric pressure is high

4. The boiling point of a solvent containing a non-volatile solute …………..
   (a) is depressed (b) is elevated (c) does not change (d) None of the above
   Ans: (b) is elevated

5. The colligative properties of dilute solution depend on …………..
   (a) the nature of the solute (b) the nature of the solvent (c) the number of particles of solute (d) number of particles of solvent
   Ans: (c) the number of particles of solute

6. Which of the following is not a colligative property?
   (a) Depression in freezing point (b) Elevation in boiling point (c) Vapour pressure (d) Osmotic pressure
   Ans: (c) Vapour pressure

7. A pressure cooker reduces cooking time because, …………..
   (a) heat is more evenly distributed (b) the high pressure tenderizes the food (c) the boiling point of water inside the cooker is depressed (d) the boiling point of water inside the cooker is depressed
   Ans: (c) the boiling point of water inside the cooker is depressed

8. The osmotic pressure of equimolar solutions of glucose, sodium chloride and barium chloride will be in the order ………………..
   (a) BaCl<sub>2</sub> > NaCl > Glucose (b) BaCl<sub>2</sub> > Glucose > NaCl (c) Glucose > BaCl<sub>2</sub> > NaCl (d) NaCl > 3aCl<sub>2</sub> > Glucose
   Ans: (a) BaCl<sub>2</sub> > NaCl > Glucose
9. Which of the following aqueous solutions would exhibit abnormal osmotic pressure?
   (a) 0.1 M sucrose  
   (b) 0.1 M glucose  
   (c) 0.1 M urea    
   (d) 0.1 M NaCl
   **Ans:** (d) 0.1 M NaCl

10. At the same temperature, 0.1 M solution of urea is isotonic with ............ solution.
    (a) 0.1 M glucose  
    (b) 0.1 M NaCl    
    (c) 0.05 M urea    
    (d) 0.1 M BaCl₂
    **Ans:** (a) 0.1 M glucose

11. The osmotic pressure of a solution with a definite concentration ............
    (a) varies directly as the volume and temperature  
    (b) varies inversely as the temperature  
    (c) varies inversely as the volume and directly as the temperature  
    (d) independent of temperature but varies inversely as the volume
    **Ans:** (c) varies inversely as the volume and directly as the temperature

12. Which of the following method is used for the determination of osmotic pressure?
    (a) Cottrell method  
    (b) Landsberger method  
    (c) Beckman method  
    (d) Berkley and Hartley method
    **Ans:** (d) Berkley and Hartley method

13. Sea water is converted into freshwater based upon the phenomenon of ............
    (a) plasmolysis  
    (b) sedimentation  
    (c) reverse osmosis  
    (d) diffusion
    **Ans:** (c) reverse osmosis

14. Calculate the osmotic pressure of 6\% urea at 300 K (molar mass = 60) (R = 0.082 1 atm. mol⁻¹. K⁻¹)
    (a) 22.4 atm  
    (b) 24.6 atm  
    (c) 2.46 atm  
    (d) 27.3 atm
    **Ans:** (b) 24.6 atm

15. Which of the following properties does not depend upon the number of solute particles?
    (a) Osmotic pressure  
    (b) Elevation in boiling point  
    (c) Boiling point of the solvent  
    (d) Depression in freezing point
    **Ans:** (c) Boiling point of the solvent

16. The flow of a solvent into a solution when two are separated by a semi-permeable membrane is called ............
    (a) diffusion  
    (b) osmosis  
    (c) effusion  
    (d) mixing
    **Ans:** (b) osmosis

17. Which of the following effect is not observed when a non-volatile solute is added to a solvent?
    (a) Decrease in vapour pressure  
    (b) Elevation of boiling point  
    (c) Lowering of freezing point  
    (d) Increase of freezing point
    **Ans:** (d) Increase of freezing point

18. The colligative properties of a non-electrolytic solution depend on ............
    (a) number of solute molecules  
    (b) nature of solute molecules  
    (c) both number and nature of solute molecules  
    (d) None of the above
    **Ans:** (c) both number and nature of solute molecules

19. Which one of the following expression indicates Raoult’s law?
    (a) \( \Delta p = p^o - p \)  
    (b) \( \frac{p - p^o}{p^o} = X_1 \)  
    (c) \( p = p^oX_1 \)  
    (d) \( p^o - p = X_2 \)
    **Ans:** (c) \( p = p^oX_1 \)
20. The relative lowering of vapour pressure is equal to ...............
   (a) mole fraction of solvent  (b) number of moles of solute
   (c) number of moles of solvent  (d) mole fraction of solute
   Ans: (d) mole fraction of solute

21. The whole scale of Beckmann thermometer covers only ...........
   (a) 100 K  (b) 273 K  (c) 6 K  (d) 0.01 K
   Ans: (c) 6 K

22. The value of molal depression constant of champhor is .............
   (a) 1.86  (b) 7.00  (c) 20.20  (d) 37.70
   Ans: (d) 37.70

23. 1.86 K kg mol\(^{-1}\) is the \(K_f\) value of .................
   (a) water  (b) camphor  (c) naphthalene  (d) phenol
   Ans: (a) water

24. Which ions are responsible for the maintenance of osmotic pressure in cells of organism?
   (a) \(\text{Fe}^{3+}\) and \(\text{Fe}^{2+}\)  (b) \(\text{Na}^+\) and \(\text{K}^+\)
   (c) \(\text{Cl}^-\) and \(\text{Br}^-\)  (d) \(\text{Al}^{3+}\) and \(\text{Be}^{2+}\)
   Ans: (b) \(\text{Na}^+\) and \(\text{K}^+\)

25. In Berkley Hartley method, the outertube is made of ...............
   (a) iron  (b) Semi-ermeable membrane  (c) gun metal  (d) cupric ferrocyanide
   Ans: (c) gun metal

12. Thermodynamics-I

1. While investigating a reaction, the system is taken to be .............
   (a) the reactants only  (b) the products only
   (c) the reactants and products  (d) the reaction vessel
   Ans: (c) the reactants and products

2. A cup filled with water and uncovered but placed in a very large cupboard is an example of ............... 
   (a) open system  (b) closed system  (c) isolated system  (d) insulated system
   Ans: open system

3. A stoppered thermos flask completely full of hot coffee is an example of .................
   (a) open system  (b) closed system  (c) an isolated system  (d) None of these
   Ans: (c) an isolated system

4. To determine heat of combustion it is essential to provide .................
   (a) \(\text{O}_2\) at low pressure  (b) 1 mole \(\text{O}_2\)
   (c) excess of \(\text{O}_2\) at a good pressure  (d) \(\text{O}_2\) diluted by inert gas
   Ans: (c) excess of \(\text{O}_2\) at a good pressure

5. Which of the following does not cause environmental pollution?
   (a) Combustion of fossil fuels  (b) Photosynthesis in plants
   (c) Non-biodegradable waste  (d) Pesticide residue
   Ans: (b) Photosynthesis in plants

6. Which of the following enthalpies is always negative?
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(a) Enthalpy of formation
(b) Enthalpy of solution
(c) Enthalpy of combustion
(d) Enthalpy of melting

Ans: (c) Enthalpy of combustion

7. \( \Delta H \) and \( \Delta U \) for the reaction \( S(s) + 3/2O_2(g) \rightarrow SO_3(g) \) are related as .................
   (a) \( \Delta H = \Delta U + RT \)   (b) \( \Delta H = \Delta U - 0.5RT \)   (c) \( \Delta H = \Delta U - RT \)   (d) \( \Delta H = \Delta U - 3/2 RT \)

Ans: (b) \( \Delta H = \Delta U - 0.5RT \)

8. A system which can exchange mass as well as energy with its surrounding is said to be a/an .........
   (a) isolated system   (b) open system   (c) closed system   (d) inert system

Ans: (b) open system

9. Enthalpy \( H \) can be defined as ..............
   (a) \( H = U - PV \)   (b) \( H = P + U + V \)   (c) \( H = U + PV \)   (d) \( H = U - TS \)

Ans: (c) \( H = U + PV \)

10. In an isothermal expansion of an ideal gas against vacuum, the work involved is ..........
    (a) zero   (b) maximum   (c) minimum   (d) None of these

Ans: (a) zero

11. In a spontaneous change, a system undergoes ............
    (a) lowering of free energy   (b) lowering of entropy   (c) increase in internal energy   (d) no energy change

Ans: (a) lowering of free energy

12. In the combustion of benzene at 0°C, the change in the number of moles \( \Delta n(g) \) is .......
    (a) 1.5   (b) -1.5   (c) 0   (d) 3

Ans: (b) -1.5

13. The enthalpies of all elements in their standard state is assumed as ...........
    (a) zero at 25°C   (b) unity at all temperature   (c) zero at 0K   (d) zero at 0°C

Ans: (a) zero at 25°C

14. Heat of formation of a compound is equal in magnitude to its heat of ............
    (a) reaction   (b) combustion   (c) decomposition to its elements   (d) dilution

Ans: (c) decomposition to its elements

15. In an isolated system, there is no exchange of ............ with the surroundings
    (a) matter   (b) energy   (c) heat   (d) energy and matter

Ans: (d) energy and matter

16. Heat exchanged in a chemical reaction at constant temperature and at constant pressure is termed as ............
    (a) internal energy   (b) enthalpy   (c) inherent energy   (d) entropy

Ans: (b) enthalpy

17. If the heat content of Y is greater than the of X, the reaction \( X \rightarrow Y \) is .............
    (a) endothermic   (b) exothermic   (c) instantaneous   (d) isothermic

Ans: (a) endothermic

18. Identify the energy change taking place in steam engine ............
    (a) Light energy to heat energy   (b) Heat energy to mechanical energy
    (c) Solar energy to electrical energy   (d) Chemical energy to electrical energy

Ans: (b) Heat energy to mechanical energy

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19. Which system permits the exchange of energy but not mass across the boundary with its surroundings?
   (a) Isolated system (b) Open system (c) Closed system (d) None of these
   **Ans : (c) Closed system**

20. Which one of the following is an extensive property?
   (a) Refractive index (b) Surface tension (c) Density (d) Internal energy
   **Ans : (d) Internal energy**

21. Which one of the following is not an extensive property?
   (a) Volume (b) Temperature (c) Mass (d) Energy
   **Ans : (b) Temperature**

22. Which one of the following is an intensive property?
   (a) Mass (b) Energy (c) Density (d) Volume
   **Ans : (c) Density**

23. In which process, the pressure of the system remains constant during its change form the initial to final state?
   (a) Isobaric process (b) Isothermal process (c) Isochoric process (d) Adiabatic process
   **Ans : (a) Isobaric process**

24. In which process, there is no change in volume of the system during its change from initial to final state of the process?
   (a) Isobaric process (b) Isothermal process (c) Isochoric process (d) Adiabatic process
   **Ans : (c) Isochoric process**

13. Chemical Equilibrium – I

1. The equilibrium constant for the reaction C(s) + CO₂(g) ? CaO(s) + CO₂(g) the K_c is equal to .................
   (a) \( \frac{[CO]^2}{[C][CO_2]} \) (b) \( \frac{[CO]^2}{[CO_2]} \) (c) \( \frac{[CO_2]}{[C]} \) (d) \( \frac{[C][CO_2]}{[CO]^2} \)
   **Ans : (b) \( \frac{[CO]^2}{[CO_2]} \)**

2. The equilibrium constant K_c for the reaction CaCO₃(s) → CaO(s) + CO₂(g) is equal to ....
   (a) \( \frac{[CaO][CO_2]}{[CaCO_3]} \) (b) \([CO_2]\) (c) \( \frac{[CaO]}{[CaCO_3]} \) (d) \( \frac{[CaO]}{[CO_2]} \)
   **Ans : (b) \([CO_2]\)**

3. At chemical equilibrium ..............
   (a) concentration of reactants > concentration of products
   (b) concentration of reactants < concentration of products
   (c) concentration of reactants = concentration of products
   (d) concentration of products < concentration of reactants
   **Ans : (c) concentration of reactants = concentration of products**

4. The reaction between silver nitrate and sodium chloride is an example of ...... reaction
   (a) reversible (b) homogeneous (c) irreversible (d) slow
   **Ans : (c) irreversible**

5. The transition of sulphur (Rh) to sulphur (m) is an example of .............. equilibrium
(a) Solid-liquid      (b) liquid –liquid      (c) solid-solid      (d) solid-gas

**Ans : (c) solid-solid**

6. Ammonia manufacture by Haber’s process is an example of ................. equilibrium
(a) liquid-liquid      (b) solid-solid      (c) solid-gas      (d) gas-phase

**Ans : (d) gas-phase**

7. Which one of the following is an example of liquid phase equilibrium?
   (a) Ammonia manufacture       (b) Decomposition of calcalcium carbonate 
   (c) Esterification reaction       (d) Sulphuric acid manufacture

**Ans : (c) Esterification reaction**

8. CaCO$_3$ ? CaO + CO$_2$ is an example of which equilibrium?
   (a) Heterogeneous equilibrium  
   (b) Homogeneous equilibrium  
   (c) Liquid phase equilibrium  
   (d) Solid-solid equilibrium

**Ans : (a) Heterogeneous equilibrium**

9. What is the value of $K_c$ for the reaction? 3Fe(s) + 4H2O(g) ? Fe3O4(s) + 4H2(g)
   (a) $K_c$ = $\frac{[Fe_3O_4][H_2]^4}{[Fe]^3[H_2O]^4}$  
   (b) $K_c$ = $\frac{[H_2]^4}{[H_2O]^4}$  
   (c) $K_c$ = $\frac{[Fe_3O_4]}{[Fe]^3}$  
   (d) $K_c$ = $\frac{[Fe_3O_4][H_2]}{[Fe]^3[H_2O]}$

**Ans : (b) $K_c$ = $\frac{[H_2]^4}{[H_2O]^4}$**

10. In the heterogeneous equilibrium, CaCO$_3$(s) ? CaO(s) + CO$_2$(g) the value of $K_c$ and $K_p$ are .................
   (a) $K_c = K_p = [CO_2]$  
   (b) $K_c = [CO_2]$; $K_p = pCO_2$  
   (c) $K_c = [CaO]$ [CO$_2$]; $K_p = pCO_2$.PCaO  
   (d) $K_c = [CaCO_3]$; $K_p = PCaCO_3$

**Ans : (b) $K_c = [CO_2]$; $K_p = pCO_2$**

14. **Chemical Kinetics – I**

1. Radioactive decay follows ................. order kinetics
   (a) zero      (b) first      (c) second      (d) third

**Ans : (b) first**

2. C$^{14}$ has a half-life of 5760 years. 100mg of sample of C$^{14}$ is reduced to 25mg in ............. years.
   (a) 23,040      (b) 1,440      (c) 11,520      (d) 720

**Ans : (b) 1,440**

3. The term $\frac{d[c]}{dt}$ in a rate equation refers to .............
   (a) the concentration of a reactant  
   (b) the change in concentration of the reactant with time 
   (c) the velocity constant of the reaction  
   (d) the decrease in concentration of the reactant with time

**Ans : (d) the decrease in concentration of the reactant with time**

4. In 1.2 years, half of 64mg of a radioactive isotope decays. The amount present after 6 years is .................
   (a) 0 mg      (b) 2 mg      (c) 8 mg      (d) 4 mg

**Ans : (b) 2 mg**

5. A large increase in the rate of a reaction for a rise of temperature is due to the ...........
   (a) increase in the number of collisions

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(b) increase in the number of activated molecules
(c) shortening of mean free path
(d) lowering of activation energy

**Ans:** (a) increase in the number of collisions

6. Which one of following factor does not influence the rate of reaction?
(a) Nature of reactants
(b) Concentration of reactants
(c) Temperature
(d) Molecularity of the reaction

**Ans:** (d) Molecularity of the reaction

7. The half-life of a first order reaction is ............... the initial concentration
(a) directly proportional to
(b) indirectly proportional to
(c) independent of
(d) equal to

**Ans:** (c) independent of

8. The unit of rate is ............
(a) sec\(^{-1}\)
(b) mol lit\(^{-1}\)
(c) mol litre\(^{-1}\) sec\(^{-1}\)
(d) mol dm\(^6\) sec\(^{-1}\)

**Ans:** (c) mol litre\(^{-1}\) sec\(^{-1}\)

9. The unit of rate constant for first order reaction is ....................
(a) sec\(^{-1}\)
(b) mol\(^{-1}\) dm\(^3\) sec\(^{-1}\)
(c) mol\(^{-1}\) dm\(^6\) sec\(^{-1}\)
(d) mol\(^{-1}\) sec\(^{-1}\)

**Ans:** (b) litre mol\(^{-1}\) sec\(^{-1}\)

10. The unit of rate constant of second order reaction is ............... (a) sec\(^{-1}\)
(b) litre mol\(^{-1}\) sec\(^{-1}\)
(c) mol\(^{-2}\) litre\(^2\) sec\(^{-1}\)
(d) mol litre\(^{-1}\) sec\(^{-1}\)

**Ans:** (b) litre mol\(^{-1}\) sec\(^{-1}\)

11. Which one of the following is an example of first order reaction?
(a) Decomposition N\(_2\)O\(_5\) to NO\(_2\) and O\(_2\)
(b) Acid hydrolysis of ester
(c) Saponification of an ester
(d) Thermal decomposition of acetaldehyde

**Ans:** (a) Decomposition N\(_2\)O\(_5\) to NO\(_2\) and O\(_2\)

12. Decomposition of H\(_2\)O\(_2\) to H\(_2\)O and O\(_2\) is an example of .......... (a) first order reaction
(b) second order reaction
(c) zero order reaction
(d) third order reaction

**Ans:** (a) first order reaction

13. Which one of the following does not affect the order of a chemical reaction?
(a) Pressure
(b) Temperature
(c) Concentration
(d) Internal energy

**Ans:** (d) Internal energy

14. Hydrolysis of sucrose in the presence of mineral acid is an example of ............ (a) zero order reaction
(b) first order reaction
(c) pseudo first order reaction
(d) second order reaction

**Ans:** (c) pseudo first order reaction

15. Which one of the following is an example of pseudo first order reaction?
(a) Decomposition of N\(_2\)O\(_5\) to NO\(_2\) and O\(_2\)
(b) Acid hydrolysis of ester
(c) Saponification of an ester
(d) Thermal decomposition of acetaldehyde

**Ans:** (b) Acid hydrolysis of ester

16. Which one of the following is a zero order reaction?
(a) NH\(_4\)NO\(_2\) \(\rightarrow\) 2H\(_2\)O + N\(_2\)
(b) CH\(_3\)COOC\(_2\)H\(_5\) + NaOH \(\rightarrow\) CH\(_3\)COONa + C\(_2\)H\(_5\)OH
(c) H\(_2\)(g) + Cl\(_2\)(g) \(\rightarrow\) 2HCl\(^{hv}\) at 450\(^o\)C

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15. Basic Concepts of Organic Chemistry

1. The systematic name of CH₃ – CH₂ – CH – NH₂ is ...................
   (a) 1-methyl-2-aminopropane (b) 2-methyl-2-aminopropane
   (c) 2-aminobutane (d) 3-aminobutane
   Ans : (c) 2-aminobutane

2. Among the following compounds, the one having the longest chain is ..............
   (a) neopentane (b) isopentane (c) 2-methyl pentane (d) 2, 2-dimethyl butane
   Ans : (c) 2-methyl pentane

3. Which of the following is not an organic compound?
   (a) Hexane (b) Urea (c) Spirit (d) 2, 2-dimethyl butane
   Ans : (d) 2, 2-dimethyl butane

4. The formula CH₃(COOH)₂ represents ..............
   (a) succinic acid (b) malonic acid (c) glutaric acid (d) adipic acid
   Ans : (b) malonic acid

5. The IUPAC name of the compound (CH₃)₃COH is ..............
   (a) trimethyl carbinol (b) 2-methyl-1 – propanol
   (c) 2-methyl-2-propanol (d) teriary butyl alcohol
   Ans : (c) 2-methyl-2-propanol

6. The common name for 2-butane is ..............
   (a) acetone (b) butyraldehyde (c) dimethyl ketone (d) ethyl methyl ketone
   Ans : (d) ethyl methyl ketone

7. The structural formula for 2-propene I-ol is ..............
   (a) CH₂ = CH – CH₂OH (b) C₂H₅ – CH = CH – CH₂OH
   (c) CH₃ – C = CH – CH₂OH (d) CH₂ = CH – CH₂OH
   Ans : (c) CH₃ – C = CH – CH₂OH
8. Who proposed vital force theory?
(a) Lavoisier (b) Berzelius (c) Clemenson (d) Sandmeyer
**Ans:** (b) Berzelius

9. Who synthesized the first organic compound urea?
(a) Lavoisier (b) Kolbe (c) Wohler (d) Berzelius
**Ans:** (c) Wohler

10. Who is considered as the father of chemistry?
(a) Berzelius (b) Lavoisier (c) Wohler (d) Kolbe
**Ans:** (b) Lavoisier

11. Who prepared acetic acid the first organic compound in the laboratory?
(a) Kolbe (b) Wohler (c) Berzelius (d) Lavoisier
**Ans:** (a) Kolbe

12. The bond energy of catenation of c is .............. K. cal. mol⁻¹.
(a) 54 (b) 39 (c) 85 (d) 35
**Ans:** (c) 85

13. Which one of the following is not a heterocyclic compound?
(a) Pyrrole (b) Toluene (c) Pyridine (d) Thiphen
**Ans:** (b) Toluene

14. Which one of the following is a heterocyclic compound?
(a) Benzene (b) Anthracene (c) Furan (d) Naphthalene
**Ans:** (c) Furan

15. The functional group of aldehyde is ..............
(a) –OH (b) –O (c) –COOH (d) –CHO
**Ans:** (c) –COOH

16. The functional group of ester is ...........
(a) –COOH (b) –COOR (c) –CONH₂ (d) –COCl
**Ans:** (b) –COOR

17. The name of functional group – C – O – C – is ..............
   \[ \overset{\text{O}}{\underset{\text{O}}{\text{O}}} \]
(a) Carboxylic acid (b) acid amide (c) acid anhydride (d) acid chloride
**Ans:** (c) acid anhydride

18. Which one of the following group is named as secondary amine group?
(a) –NH₂ (b) –NH (c) –N (d) –NO₂
**Ans:** (b) –NH

19. The IUPAC name of CH₃ – CH₂ – CHO is ..............
(a) propanol (b) propanone (c) propanal (d) propionaldehyde
**Ans:** (c) Propanal

20. Which is the functional group of nitroso compound?
(a) –NO (b) –NO₂ (c) –NH₂ (d) N ≡ N
**Ans:** (a) –NO

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21. What is the IUPAS name of \( \text{CH}_3 \text{– CH}_2 \text{– C – Cl} \)?

(a) tertiary pentyl chloride  
(b) 1-chloro 1, 1 dimethyle propane  
(c) 3, 3 – dimethyl chloropropane  
(d) 2-methyl-2-chlorobutane  
**Ans:** (d) 2-methyl-2-chlorobutane

22. The IUPAC name of allyl chloride is ...............

(a) Chloropropene  
(b) 3 – chloro – 2 – propene  
(c) 3- chloro – 1 – propene  
(d) 1 – chloro – 3- propene  
**Ans:** 3- chloro – 1 – propene

23. The structural formula of chloroethene is ...............

(a) \( \text{CH}_2 = \text{CH} \text{– CH}_2 \text{Cl} \)  
(b) \( \text{CH}_2 = \text{CHCl} \)  
(c) \( \text{CH} = \text{CH} \)  
(d) \( \text{CH}_3 – \text{CH}_2 \text{Cl} \)  
**Ans:** (b) \( \text{CH}_2 = \text{CHCl} \)

24. Which one of the following structure indicates 2-iodo-2-methyl propane?

(a) \( \text{CH}_3 \text{– C – CH}_3 \)  
(b) \( \text{CH}_3 – \text{CH – CH}_2 \text{I} \)  
(c) \( \text{CH}_3 – \text{CH}_2 – \text{CH}_2 – \text{CH}_2 \text{I} \)  
(d) \( \text{CH}_3 – \text{CH – CH}_2 – \text{CH}_3 \)  
**Ans:** \( \text{CH}_3 \text{– C – CH}_3 \)

25. Which is the IUPAC name of isopropyl methyl ether?

(a) 1- methoxy propane  
(b) Ethoxy ethane  
(c) Propoxy methane  
(d) 2-methoxy propane  
**Ans:** (d) 2-methoxy propane

26. Which one of the following structure indicates 2-methyl propanal?

(a) \( \text{CH}_3 – \text{CH – CHO} \)  
(b) \( \text{CH}_3 – \text{CH}_2 – \text{CH}_2 – \text{CHO} \)  
(c) \( \text{CH}_3 – \text{CH}_2 – \text{CHO} \)  
(d) \( \text{CH}_3 – \text{CH – CH}_2 – \text{CHO} \)  
**Ans:** \( \text{CH}_3 \)

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### 27. Which is the correct structural formula of trimethyl amine?

- (a) \( \text{CH}_3 – 
\text{CH} – \text{NH}_2 \)
- (b) \( \text{CH}_3 – 
\text{CH}_2 – \text{N} – \text{CH}_3 \)
- (c) \( \text{CH}_3 – \text{N} – \text{CH}_3 \)
- (d) \( \text{CH}_3 – \text{NH}_2 \)

**Ans:** (c) \( \text{CH}_3 – \text{N} – \text{CH}_3 \)

### 28. \( n \) – butyl alcohol and isobutyl alcohol belong to which isomerism?

- (a) Carbon chain isomerism
- (b) Position isomerism
- (c) Functional isomerism
- (d) Metamerism

**Ans:** (a) Carbon chain isomerism

### 29. Isobutyl alcohol and tert butyl alcohol belong to which isomerism?

- (a) Carbon chain isomerism
- (b) Position isomerism
- (c) Functional isomerism
- (d) Metamerism

**Ans:** (b) Position isomerism

### 30. Propanoic acid and methyl acetate are the examples of ............

- (a) Carbon chain isomerism
- (b) Position isomerism
- (c) Functional isomerism
- (d) Metamerism

**Ans:** (c) Functional isomerism

### 31. The reaction between tert. butyl chloride and aqueous KOH is an example of ............

- (a) \( \text{S}_1^\text{N} \)
- (b) \( \text{S}_2^\text{N} \)
- (c) \( \text{E}_1 \)
- (d) \( \text{E}_2 \)

**Ans:** (a) \( \text{S}_1^\text{N} \)

### 32. The reaction between methane and chlorine follows ............ mechanism

- (a) Electrophilic substitution
- (b) Nucleophilic substitution
- (c) Free radical substitution
- (d) Addition

**Ans:** (c) Free radical substitution

### 33. Which mechanism is followed in the reaction of methyl chloride with aqueous KOH?

- (a) \( \text{S}_1^\text{N} \)
- (b) \( \text{S}_2^\text{N} \)
- (c) \( \text{E}_1 \)
- (d) \( \text{E}_2 \)

**Ans:** (b) \( \text{S}_2^\text{N} \)

### 34. Which one of the following takes place by \( \text{E}_2 \) mechanism?

- (a) tertiary butyl bromide + Alcoholic KOH
- (b) Primary alkyl chloride + Aqueous KOH
- (c) \( n \) – propyl bromide + Alcoholic KOH
- (d) Tertiary butyl chloride + Aqueous KOH

**Ans:** (c) \( n \) – propyl bromide + Alcoholic KOH

### 35. Identify the electrophilic reagent among the following ............

- (a) \( \text{NH}_3 \)
- (b) \( \text{H}_2\text{O} \)
- (c) \( \text{RNH}_2 \)
- (d) \( \text{NO}^+\text{2} \)

**Ans:** (d) \( \text{NO}^+\text{2} \)

### 36. Which one of the following is a nucleophilic reagent?

- (a) \( \text{NH}_3 \)
- (b) \( \text{AlCl}_3 \)
- (c) \( \text{BF}_3 \)
- (d) \( \text{FeCl}_3 \)

**Ans:** (a) \( \text{NH}_3 \)
16. Purification of Organic Compounds

1. Organic compounds are insoluble in ............
   (a) ether   (b) alcohol   (c) water   (d) benzene
   **Ans : (c) water**

2. Naphthalene and camphor are purified by ........... process
   (a) sublimation   (b) simple distillation
   (c) solvent extraction   (d) steam distillation
   **Ans : (a) sublimation**

3. By which method diethyl ether and ethyl alcohol are separated and purified?
   (a) Sublimation   (b) simple distillation
   (c) Fractional crystallisation   (d) steam distillation
   **Ans : (b) simple distillation**

4. Which method is used to separate and purify benzene and toluene?
   (a) Sublimation   (b) Crystallisation
   (c) Fractional crystallisation   (d) Fractional distillation
   **Ans : (d) Fractional distillation**

5. Which compound is purified by steam distillation method?
   (a) Naphthalene   (b) Camphor   (c) Aniline   (d) Benzoic acid
   **Ans : (c) Aniline**

6. Which organic compound is purified by distillation under reduced pressure?
   (a) Glycerol   (b) Camphor   (c) Diethyl ether   (d) Ethanol
   **Ans : (a) Glycerol**

7. Which one of the following compound is not used as an adsorbent?
   (a) Alumina   (b) Benzene   (c) Silica gel   (d) starch
   **Ans : (b) Benzene**

8. Which one of the following can be used as stationary phase?
   (a) Ether   (b) Benzene   (c) Carbon tetrachloride   (d) Silica gel
   **Ans : (d) Silica gel**

9. Identify the compound that can be used as an adsorbent in TLC ............
   (a) Silica gel   (b) Alumina   (c) Both (a) (or) (b)   (d) None of these
   **Ans : (c) Both (a) (or) (b)**

10. In descending paper chromatography, the mobile phase moves ..........
    (a) upwards   (b) downwards   (c) horizontally   (d) None of these
    **Ans : (b) downwards**
17. Detection and Estimation of Elements

1. The colour of anhydrous copper sulphate is ...........
   (a) blue   (b) White   (c) Green   (d) Violet
   **Ans : (b) White**

2. Carbon dioxide turns lime water milky due to the formation of ...........
   (a) CaCO$_3$   (b) CaCl$_2$   (c) Ca(OH)$_2$   (d) CaO
   **Ans : (a) CaCO$_3$**

3. Which element in the organic compound is detected indirectly?
   (a) Nitrogen   (b) Sulphur   (c) Hydrogen   (d) Oxygen
   **Ans : (d) Oxygen**

4. The molecular formula of ferric ferrocyanide is ...........
   (a) Fe (CNS)$_3$   (b) Fe$_3$[Fe(CN)$_6$]   (c) Fe$_4$[Fe(CN)$_6$]$_3$   (d) Na$_4$[Fe(CN)]
   **Ans : (c) Fe$_4$[Fe(CN)$_6$]$_3$**

5. The colour produced by nitrogen and sulphur in an organic compound during Lassaigne’s test is ..............
   (a) Prussian blue colour   (b) Violet colour   (c) Black colour   (d) Blood red colour
   **Ans : (d) Blood red colour**

6. Which element produce purple colour in Lassaigne’s test?
   (a) Nitrogen   (b) Sulphur   (c) Chlorine   (d) Bromine
   **Ans : (b) Sulphur**

7. Carbon and hydrogen are estimated by ..............
   (a) Lassaigne’s test   (b) Carius method   (c) Liebig’s combustion method   (d) Kjeldahl’s method
   **Ans : (c) Liebig’s combustion method**

8. In Liebig’s combustion method, which compound is used to absorb CO$_2$?
   (a) Anhydrous CaCl$_2$   (b) Anhydrous AlCl$_3$   (c) Quicklime   (d) Caustic potash
   **Ans : (d) Caustic potash**

9. In Liebig’s combustion method, anhydrous calcium chloride is used to absorb ..............
   (a) water   (b) CO$_2$   (c) H$_2$   (d) O$_2$
   **Ans : (a) water**

10. Ajeldahl’s method is used to estimate ..............
    (a) oxygen   (b) nitrogen   (c) sulphur   (d) halogens
    **Ans : (b) nitrogen**

18. Hydrocarbons

1. Mesitylene is produced by the polymerization of ..............
   (a) Ethyne   (b) Propyne   (c) Ethene   (d) Dimethyl acetylene
   **Ans : (b) Propyne**

2. The compound formed when acetylene reacts with ammoniacal solution of cuprous chloride is ..............
   (a) Silver acetylide   (b) copper acetylide   (c) benzene   (d) CH$_3$CHO
   **Ans : (b) copper acetylide**

3. Which one of the following is used as a catalyst in cracking?
   (a) Metal   (b) Zn + HCl   (c) Metallic oxide   (d) ROH
   **Ans : (b) Zn + HCl**
Ans: (c) Metallic oxide
4. Alkene are otherwise known as ............
   (a) paraffins  (b) olefins  (c) acetylene  (d) saturated hydrocarbon
   Ans: (b) olefins
5. The catalytic reduction of alkene is known as ............ reduction
   (a) Rosenmund’s  (b) acid medium  (c) Sabatier-senderens  (d) Clemmenson
   Ans: (c) Sabatier-senderens
6. Which reagent is used to convert Grignard reagent to alkane?
   (a) Water  (b) CO₂  (c) HCHO  (d) CH₃CHO
   Ans: (a) Water
7. The decarboxylation reaction is carried out by using ............
   (a) quicklime  (b) lime water  (c) soda lime  (d) caustic soda
   Ans: (c) soda lime
8. Which one of the following method is not applicable for the preparation of alkane?
   (a) Wurtz reaction  (b) Kolbe’s electrolytic method  (c) Decarboxylation of fatty acid  (d) Fitting reaction
   Ans: (d) Fitting reaction
9. Which catalyst is used in the conversion of alcohol to alkane by HI?
   (a) I₂  (b) P  (c) CO  (d) Fe₂O₃
   Ans: (b) P
10. The dipole moment of branched chain alkane is .................
    (a) zero  (b) maximum  (c) twice  (d) thrice
    Ans: (a) zero
11. Which mechanism is followed by nitration of alkane?
    (a) S⁻¹²  (b) Electrophilic  (c) Free radical  (d) Ionic
    Ans: (c) Free radical
12. Name the product formed when methane is oxidized by molybdenum trioxide .............
    (a) Formic acid  (b) Formaldehyde  (c) Carbon dioxide  (d) All of these
    Ans: (b) Formaldehyde
13. What reaction takes place when n-alkane is heated with anhydrous AlCl₃ and HCl at 300°C?
    (a) Isomerisation  (b) Atomisation  (c) Aromatization  (d) Polymerisation
    Ans: (a) Isomerisation
14. Which one of the catalyst is used in aromatization of alkane?
    (a) Ni + Al/NaOH  (b) Cr₂O₃ + Al₂O₃  (c) Zn-Cu/ C₂H₅OH  (d) Zn + HCl
    Ans: (b) Cr₂O₃ + Al₂O₃
15. Which reagent is used to convert ethane to acetic acid?
    (a) Cu  (b) Ag  (c) Ag₂O  (d) KMnO₄
    Ans: (c) Ag₂O
16. Which one of the following on ozonolysis yield glyoxal and formic acid?
    (a) Ethylene  (b) Propyne  (c) Ethyne  (d) Dimethyl acetylene
    Ans: (c) Ethyne
17. What is the product formed when alcohols are heated with conc. H₂SO₄?

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Dedication! Determination!! Distinction!!!

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DON'T STRESS ! DO YOUR BEST !! FORGET THE REST!!!

(a) Alkane (b) Alkene (c) Alkyne (d) Aldehyde

**Ans : (b) Alkene**

18. Which reagent is used for dehydrohalogenation of alkyl halide?
(a) Caustic soda (b) Lime water (c) Alcoholic KOH (d) Aqueous KOH

**Ans : (c) Alcoholic KOH**

19. Which isomerism is present in but-1-ene and 2-methyl prop-1-ene?
(a) Position isomerism (b) Metamerism (c) Chain isomerism (d) Tautomerism

**Ans : (c) Chain isomerism**

20. Which one of the following product is formed when isobutylene is treated with HI?
(a) Isobutyl iodide (b) Tert.butyl iodide (c) n-butyl iodide (d) sec.butyl iodide

**Ans : (b) Tert.butyl iodide**

21. Name the produce formed when propylene reacts with HBr in the presence of peroxide ............
(a) n-propyl bromide (b) Isopropyl bromide (c) sec. propyl bromide (d) Ethyl bromide

**Ans : (a) n-propyl bromide**

22. Which one of the following gives only formaldehyde on ozonolysis?
(a) Propylene (b) Acetylene (c) 1-butene (d) Ethylene

**Ans : (d) Ethylene**

23. The reducing agent used in the conversion of an ozonide to carbonyl compound is .......... 
(a) H₂O₂ (b) H₂O (c) Zn + CH₃COOH (d) Ni

**Ans : (c) Zn + CH₃COOH**

24. Which one of the following is used in making printing ink and black pigments?
(a) Ethane (b) Carbon black (c) Ethylene (d) Acetylene

**Ans : (b) Carbon black**

25. Which one of the following is used for ripening of fruits?
(a) Ethylene (b) Ethane (c) Ethyne (d) Ethanol

**Ans : (a) Ethylene**

26. Name the synthetic rubber prepared from ethylene dichloride ..........
(a) GRA rubber (b) Buna-N-rubber (c) Neoprene (d) Thiokol

**Ans : (d) Thiokol**

27. Which product is formed when cyclohexane is passed over heated nichrome wire?
(a) Butylene (b) But-2-ene (c) Buta-1, 3-dine (d) Isobutylene

**Ans : (c) Buta-1, 3-dine**

28. The explosion by direct combination of acetylene with chlorine can be prevented by ................. 
(a) hydrolysis (b) dehydrohalogenation (c) using a metal chloride catalyst (d) oxidation

**Ans : (c) using a metal chloride catalyst**

29. Which one of the following is formed when acetylene is hydrolysed?
(a) Vinyl alcohol (b) Acetaldehyde (c) Ethyl alcohol (d) None of these

**Ans : (b) Acetaldehyde**

19. Aromatic Hydrocarbons

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1. Benzene was isolated by Faraday from the gas obtained from .......... (a) coal tar (b) petroleum (c) the pyrolysis of whale oil (d) acetylene
   **Ans:** (c) the pyrolysis of whale oil

2. Benzene was first synthesized by .................
   (a) Faraday  (b) Hoffmann  (c) Berthlot  (d) Arrhenius
   **Ans:** (c) Berthlot

3. Which product is formed by the decarboxylation of benzoic acid?
   (a) Benzene  (b) Toluene  (c) Benzoyl peroxide  (d) Mesitylene
   **Ans:** (a) Benzene

4. The aromatic compound are found in the female steroidal harmone ..............
   (a) morphine  (b) estrone  (c) penicillin  (d) aspirin
   **Ans:** (b) estrone

5. Which is the first member in the aromatic series of the compounds?
   (a) Toluene  (b) Xylene  (c) Naphthalene  (d) Benzene
   **Ans:** (d) Benzene

6. Which one of the following is a meta directing group?
   (a) –OH  (b) –NH₂  (c) –X  (d) –NO₂
   **Ans:** (d) –NO₂

7. Which one of the following is ortho and para directing group?
   (a) –NO₂  (b) –CHO  (c) –NH₂  (d) –COOH
   **Ans:** (c) –NH₂

8. Which one of the following is the product when phenol is distilled with zinc dust?
   (a) Anisole  (b) Benzene  (c) Phenoxide  (d) Toluene
   **Ans:** (b) Benzene

9. The formation of toluene from bromobenzene and bromomethane is known as ............ reaction
   (a) Friedel-Craft’s  (b) Fitting  (c) Wurtz-fitting  (d) Wurtz
   **Ans:** (c) Wurtz-fitting

10. Which one of the following is very unreactive even in the presence of a catalyst?
    (a) Chlorine  (b) Iodine  (c) Bromine  (d) Fluorine
    **Ans:** (b) Iodine

11. The bond length of C-C in benzene ring is equal to ............
    (a) 1.54 Å  (b) 1.34 Å  (c) 1.39 Å  (d) 1 Å
    **Ans:** (c) 1.39 Å

12. The hybridization of carbon atom is benzene is ............
    (a) sp³  (b) sp²  (c) sp  (d) sp³d
    **Ans:** (b) sp²

13. Which one of the following is used as a fuel along with petrol?
    (a) Benzene  (b) Coal  (c) Coke  (d) Naphthalene
    **Ans:** (a) Benzene

14. Which one of the following is a monocyclic aromatic hydrocarbon?
    (a) Phenol  (b) Toluene  (c) Naphthalene  (d) Anthracene
    **Ans:** (b) Toluene

15. Which one of the following is a polycyclic aromatic hydrocarbon?

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20. Organic Halogen Compounds

1. The organic compound used in the treatment of Typhoid fever is ..........
   (a) Chloromycetin  (b) thyroxin  (c) chloroquinine  (d) halothane
   Ans : (a) Chloromycetin

2. Thyroxine is used for the treatment of ...........
   (a) typhoid  (b) goiter  (c) malaria  (d) surgery
   Ans : (b) goiter

3. Which medicine is used to curve malaria?
   (a) Chloromycetin  (b) Thyroxine  (c) Chloroquinine  (d) Halothene
   Ans : (c) Chloroquinine

4. Which compound is used as an anesthetic during surgery?
   (a) Halothane  (b) Chloroquinine  (c) Chloromycetin  (d) Thyroxine
   Ans : (a) Halothane

5. The functional group of primary alkyl halide is .............
   (a) > CH X  (b) –CH₂ X  (c) > CX  (d) –CHCl
   Ans : (b) –CH₂ X

6. The IUPAC name of \[ \text{CH₃ – CH – CH₂Br} \] is ................
   (a) isobutyl bromide  (b) 2-methyl-3-bromopropane  (c) 1-bromo-2-methyl propane  (d) 2-methyl propyl bromide
   Ans : (c) 1-bromo-2-methyl propane

7. The structural formula of propylidene chloride is ............
   \[ \text{CH₃ – CH – CH₃} \]
   (a) \[ | \text{Cl} \]  (b) \[ \text{CH₃ – CH₂ – CHCl₂} \]
   (c) \[ \text{CH₃ – CH₂ – CH₂Cl} \]  (d) \[ \text{CH₃ – C – CH₃} \]
   Ans : (b) \[ \text{CH₃ – CH₂ – CHCl₂} \]

8. The IUPAC name of \[ \text{I} \] is .................
   (a) isopropyl iodide  (b) n-propyl iodide  (c) 1-iodo propane  (d) 2-iodo propane
   Ans : (d) 2-iodo propane

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9. 2-bromo-2-methyl butane is .................. 
   CH₃ – CH – CH₂ – CH₃  
   (a) Br  
   (b) CH₃ – C – CH₂ – CH₃  
   CH₃  
   (c) CH₃ – C – CH₃  
   (d) CH₃ – CH – CH₂ – Br  

   Ans : Br  
   (b) CH₃ – C – CH₂ – CH₃  
   CH₂ – CH – CH₂ – CH₂Cl

10. The IUPAC name is ..................  

   (a) 1-bromo – 2, 4 – dichlorobutane  
   (b) 4-bromo – 1,3 – dichlorobutane  
   (c) 2, 4 – dichloro – 1- bromobutane  
   (d) 1- bromo n – butyl chloride  

   Ans : (a) 1-bromo – 2, 4 – dichlorobutane

11. The structure of 2-bromo, 3-chloro, 2, 4 – dimethyl pentane is ..................  

   (a) CH₂Br – CHCl – CH₂ – CH₂Cl  
   Br  
   (b) CH₃ – CCl₂ – CHBr – CH₃  
   CH₃  
   (c) CH₃ – C – CH – CH – CH₃  
   (d) CH₃Cl – CH₃  

   Ans : Br  
   (c) CH₃ – C – CH – CH – CH₃  
   CH₃Cl – CH₃

12. The Lucas reagent is ...............  

   (a) ZnCl₂  
   (b) conc. HCl + ZnCl₂  
   (c) anhydrous AlCl₃  
   (d) FeCl₃  

   Ans : (b) conc. HCl + ZnCl₂

13. Which alcohol immediately gives alkyl chloride when treated with Lucas reagent?  

   (a) 2 – Propanol  
   (b) 1- butanol  
   (c) Ethanol  
   (d) 2-methyl-2-propanol  

   Ans : (d) 2-methyl-2-propanol

14. The order of stability of carbonium ion is ...............  

   (a) primary carbonium ion > secondary carbonium ion > tertiary carbonium ion
(b) tertiary carbonium ion > secondary carbonium ion > primary carbonium ion
(c) secondary carbonium ion > primary carbonium ion > tertiary carbonium ion
(d) tertiary carbonium ion > primary carbonium ion > secondary carbonium ion

**Ans : (b) tertiary carbonium ion > secondary carbonium ion > primary carbonium ion**

15. Which mechanism is followed by the halogenations of hydrocarbons?
(a) Carbonium ion formation  (b) Carbanion formation
(c) Free radical mechanism  (d) E₂ mechanism

**Ans : (c) Free radical mechanism**

16. Which one of the following is treated with alkyl halide in Swarts reaction?
(a) AgF  (b) SbF₃  (c) Both  (d) Either (a) or (b)

**Ans : (d) Either (a) or (b)**

17. Which product is formed when acetone reacts with PCl₅?
(a) Isopropylidene chloride  (b) 2 chloropropane
(c) n-propyl chloride  (d) tert. butyl chloride

**Ans : (a) Isopropylidene chloride**

18. Which one of the following compound is used as fire extinguisher and as a solvent?
(a) CHCl₃  (b) CH₃Cl  (c) CH₂Cl₂  (d) CCl₄

**Ans : (d) CCl₄**

19. Identify the best solvent for fats and oils ..............
(a) CH₃Cl  (b) CH₂Cl₂  (c) Tetrachloroethylene  (d) CHCl₃

**Ans : (c) Tetrachloroethylene**

20. The hydrolysis of primary alkyl halide by aqueous NaOH is an example of ............
(a) S¹ mechanism  (b) S² mechanism  (c) E₁ mechanism  (d) E₂ mechanism

**Ans : (b) S² mechanism**

21. Which one of the following is an example for S¹ mechanism?
(a) Primary alkyl halid + aqueous NaOH  (b) Primary alkyl halid + alcoholic KOH
(c) Tertiary alkyl halide + aqueous NaOH  (d) Tertiary alkyl halide +alcoholic KOH

**Ans : (c) Tertiary alkyl halide + aqueous NaOH**

22. The shape of carbocation is planar due to the presence of carbon which is in .........
(a) sp hybridized  (b) dsp³ hybridised  (c) sp³ hybridised  (d) sp² hybridised

**Ans : (d) sp² hybridised**

23. Secondary alkyl halide undergoes hydrolysis by ............
(a) S¹ mechanism  (b) S² mechanism
(c) Both S¹ and S² mechanism  (d) None of these

**Ans : (c) Both S¹ and S² mechanism**

24. Tertiary alkyl halides undergo hydrolysis by ............
(a) S¹ mechanism  (b) S² mechanism
(c) Both S¹ and S² mechanism  (d) None of these

**Ans : (a) S¹ mechanism**

25. The reaction between primary alkyl halide and alcoholic KOH take place by which mechanism?
(a) S¹  (b) S²  (c) E₁  (d) E₂

**Ans : (d) E₂**
26. Which one of the following is formed as product when tert, butyl bromide treated with alcoholic KOH?
(a) 2-methyl propene (b) Propylene (c) 1-butene (d) 2-butene
Ans : (a) 2-methyl propene

27. The organic halogen compound that used as an antiseptic is ..............
(a) CHCl₃ (b) CHI₃ (c) CCl₄ (d) CH₃I
Ans : (b) CHI₃

28. Which organic halogen compound is used as a refrigerant?
(a) CHCl₃ (b) CHI₃ (c) CF₂Cl₂ (d) CCl₄
Ans : (c) CF₂Cl₂

29. CCl₄ is used as ..............
(a) an anaesthetic (b) an antiseptic (c) a fire extinguisher (d) a refrigerant
Ans : (c) a fire extinguisher

30. Which one of the following is an example of aryl halide?
(a) Chlorobenzene (b) Chloromethane (c) Benzyl chloride (d) Phenyl magnesium chloride
Ans : (a) Chlorobenzene

31. Benzyl chloride is an example of ..............
(a) aryl chloride (b) aralkyl chloride (c) primary alkyl chloride (d) secondary alkyl chloride
Ans : (b) aralkyl chloride

32. Which is used as a catalyst in the conversion of benzene to chlorobenzene?
(a) FeCl₃ (b) Fe (c) AlCl₃ (d) ZnCl₂
Ans : (a) FeCl₃

33. The formation of biphenyl from chlorobenzene is named as .............. reaction
(a) Wurtz (b) Wurtz-Fitting (c) Fitting (d) Friedel – Craft’s
Ans : (c) Fitting

34. Phenyl magnesium chloride is prepared in the medium of ..............
(a) ether (b) water (c) tetrahydrofuran (d) alcohol
Ans : (c) tetrahydrofuran

35. Which one of the following is formed when chloral is treated with chlorobenzene?
(a) BHC (b) DDT (c) Dichlorobenzene (d) Benzene
Ans : (b) DDT

36. Which reagent is used to convert benzyl chloride to toluene?
(a) C₂H₅OH (b) H₂O (c) Zn-Cu (d) Ni-Al/NaOH
Ans : (c) Zn-Cu

37. Which compound reacts with methyl magnesium iodide followed by hydrolysis to yield tertiary alcohol?
(a) Formaldehyde (b) Acetone (c) Acetaldehyde (d) Ethyl formate
Ans : (b) Acetone

38. Formaldehyde reacts with methyl magnesium iodide followed by hydrolysis yield ..............
(a) 2-propanol (b) ethanol (c) 2-methyl 2-propanol (d) acetic acid
Ans : (b) ethanol
39. Name the product formed when methyl magnesium iodide is treated with water
(a) Ethanol    (b) 2-propanol    (c) Acetic acid    (d) Methane
Ans : (d) Methane

40. With which reagent methyl magnesium iodide reacts to give ethanoic acid?
(a) Ethyl formate    (b) Solid CO₂    (c) Cyanogen chloride    (d) H₂O
Ans : (b) Solid CO₂

41. When ethyl iodide reacts with alcoholi KOH, the product formed is ..........  
(a) ethane    (b) ethanol    (c) ethane    (d) ether
Ans : (c) ethane

42. 2-chlorobutane is a ............
(a) Primary alkyl chloride    (b) sec. alkyl chloride
(c) tertiary alkyl chloride    (d) aryl chloride
Ans : (b) sec. alkyl chloride

43. The produce formed when methyl magnesium iodide reacts with acetaldehyde followed by hydrolysis is ..........  
(a) 1 – propanol    (b) 2-propanol    (c) 2-methyl-2-propanol    (d) ethanol
Ans : (b) 2-propanol

44. Which reagent reacts with chlorobenzene to produce DDT?
(a) Chloroform    (b) Chloral    (c) Chloretone    (d) Trichloroacetone
Ans : (b) Chloral

45. Which one of the following is an example of sec.alkyl halide?
(a) Isobutyl chloride    (b) Isopropyl chloride
(c) Ethyl chloride    (d) n-butyl chloride
Ans : (b) Isopropyl chloride

46. The structural formula of 1-bromo-2, 2 – dimethyl propane is .................
(a) CH₃ – CH – CH – Br    (b) CH₃ – C – CH₂Br
   |      |       |      |
   CH₃  CH₃  |      |      |
   |      |   H   |
   CH₃    |       |
   |      |      |
   (c) CH₃ – C – Br    (d) CH₃ – C – CH₂Br
   |      |       |      |
   CH₃  CH₃  |      |      |
   |      |      |
Ans :             
(d) CH₃ – C – CH₂Br
   |      |       |
   CH₃

47. Which one of the alkyl halide is more reactive?
(a) Primary alkyl halide    (b) Tertiary alkyl halide
<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>48. Alkyl halides are insoluble in water due to</td>
<td>(a) formation of hydrogen bond</td>
<td>(b) inability to form hydrogen bond</td>
</tr>
<tr>
<td>49. Which reagent is used to convert chlorobenzene to benzene?</td>
<td>(a) NH₂NH₂ (b) Ni-Al/NaOH (c) NH₂OH (d) HNO₃</td>
<td>(b) Ni-Al/NaOH</td>
</tr>
<tr>
<td>50. BHC is</td>
<td>(a) an explosive</td>
<td>(b) a artificial fibre (c) a drug</td>
</tr>
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40% QUESTIONS BOOK BACK & IMPORTANT 60% QUESTIONS CREATIVE.

Respected teachers/parents/students,
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